Phylogenetic Relationships of a New Genus of Calliopsine Bees from Peru, with a Review of *Spinoliella* Ashmead (Hymenoptera: Andrenidae)

Victor H. Gonzalez, Allan H. Smith-Pardo and Michael S. Engel

Bulletin of the American Museum of Natural History

PHYLOGENETIC RELATIONSHIPS OF A NEW GENUS OF CALLIOPSINE BEES FROM PERU, WITH A REVIEW OF *SPINOLIELLA* ASHMEAD (HYMENOPTERA: ANDRENIDAE)

VICTOR H. GONZALEZ
Undergraduate Biology Program and Department of Ecology & Evolutionary Biology, University of Kansas, Lawrence, Kansas

ALLAN H. SMITH-PARDO
United States Department of Agriculture, APHIS-PPQ, South San Francisco, California

MICHAEL S. ENGEL
Division of Invertebrate Zoology, American Museum of Natural History, New York; Division of Entomology, Natural History Museum, and Department of Ecology & Evolutionary Biology, University of Kansas, Lawrence, Kansas

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY
Number 412, 71 pp., 21 figures, 4 tables
Issued April 13, 2017

Copyright © American Museum of Natural History 2017 ISSN 0003-0090

CONTENTS

Abstract 3
Introduction 3
Material and Methods 4
Phylogenetic Analysis 5
Phylogenetic Results 10
Systematics 11
Tribe Calliopsini Robertson 11
Key to Genera of Calliopsini 11
Xeranthrena Gonzalez and Engel, new genus 14
Xeranthrena imponticula Gonzalez and Engel, new species 18
Genus *Spinoliella* Ashmead 20
Key to Species of *Spinoliella* 20
Spinoliella aidae Gonzalez, Smith-Pardo, and Engel, new species 27
Spinoliella confusa Gonzalez and Engel, new species 31
Spinoliella herbsti (Friese) 36
Spinoliella incudinotata Compagnucci 38
Spinoliella longirostris Toro 40
Spinoliella maculata (Spinola) 41
Spinoliella nomadoides (Spinola) 43
Spinoliella obscura Compagnucci 45
Spinoliella opaca Rodríguez, Toro, and Ruz 45
Spinoliella packeri Gonzalez and Engel, new species 47
Spinoliella polita Gonzalez and Engel, new species 52
Spinoliella propinqua Gonzalez and Engel, new species 54
Spinoliella psamita Toro and Ruz 58
Spinoliella rozeni Toro and Ruz 60
Spinoliella rufiventris Toro and Ruz 62
Spinoliella ruzi Compagnucci 65
Spinoliella tadeyi Compagnucci 65
Discussion 67
Acknowledgments 68
References 68

ABSTRACT

We establish a new genus for an unusual species of Peruvian calliopsine bees (Panurginae: Calliopsini) that was initially reported in the literature as an undescribed species of *Spinoliella* Ashmead that purportedly expanded the range of the latter genus beyond Argentina and Chile. Although the new genus superficially resembles *Spinoliella*, it is easily distinguished by a unique combination of characters in both sexes but particularly in the male hidden metasomal sterna and genitalia. A cladistic analysis of 82 adult external morphological characters including all species of *Spinoliella*, as well as species of the remaining genera of Calliopsini, suggests that this group is sister to a clade consisting of *Spinoliella* and *Callonychium* Brèthes. We describe and illustrate *Xeranthrena imponticula* Gonzalez and Engel, new genus and species, from males and females collected in xeric areas along the Pacific slopes of the Peruvian Andes. In addition, the phylogenetic study suggests two well-defined clades within *Spinoliella* and corresponding to the previously recognized subgenera, although we do not advocate for their reinstatement. We briefly discuss new putative synapomorphies for *Spinoliella* and, building upon prior revisionary work, we describe and figure five new species: *Spinoliella aidae* Gonzalez, Smith-Pardo, and Engel, new species; *S. confusa* Gonzalez and Engel, new species; *S. propinqua* Gonzalez and Engel, new species; *S. packeri* Gonzalez and Engel, new species; and *S. polita* Gonzalez and Engel, new species. In addition, we synonymize *S. karhadra* Rodríguez, Toro, and Ruz under *S. rufiventris* Toro and Ruz (new synonymy). We provide new geographical and floral records, an identification keys to all 17 recognized species of *Spinoliella*, and updated key to the genera of Calliopsini.

INTRODUCTION

Calliopsini are a Western Hemisphere tribe of panurgine bees abundant and diverse in both northern and southern temperate zones, and especially in xeric areas, but poorly represented to nearly absent in the tropics (Ruz, 1986, 1991; Michener, 2007). The tribe is monophyletic and consists of about 120 species grouped into six genera and multiple subgenera, particularly in the diverse genus *Calliopsis* Smith (table 1). Revisionary work on the tribe has been comparatively thorough relative to other New World Panurginae, with modern revisions and treatments for the genera *Acamptopoeum* Cockerell (Shinn, 1965; Compagnucci, 2004; Gonzalez, 2004), *Arhysosage* Brèthes (Engel, 2000; Ramos, 2013), and *Spinoliella* Ashmead (Toro and Ruz, 1972a, 1972b; Rodríguez et al., 2001; Compagnucci, 2015). In addition, faunal revisions and treatments of individual subgenera for *Calliopsis* or *Callonychium* Brèthes are also available (Rozen, 1958; Shinn, 1967; Toro and Herrera, 1980; Danforth, 1994). Phylogenetic relationships among the genera of Calliopsini were studied by Ruz (1986, 1991), and more recently by Roig-Alsina and Compagnucci (2003) although these authors focused on exploring the placement of the genus *Litocalliopsis* Roig-Alsina and Compagnucci. The results of these works are largely identical except in the placement of the genus *Acamptopoeum*. Whereas the former placed *Acamptopoeum* as sister to *Calliopsis* (Ruz, 1986, 1991), the latter recovered the genus as basal and sister to all other Calliopsini (Roig-Alsina and Compagnucci, 2003). Based on the topology of the latter work, the tribe can be organized into three subgroups: *Acamptopoeum*; *Litocalliopsis* and *Calliopsis* (the "*Calliopsis* group"); and *Arhysosage*, *Spinoliella*, and *Callonychium* (the "*Spinoliella* group" sensu Rozen, 2013). Immature stages have been described for representative species of all genera (Rozen and Yanega, 1999; Rozen, 2013), with the exception of *Litocalliopsis* and the new genus described below. Available larval morphology generally supports the pattern of relationships as understood from data based on adults (Rozen, 2013).

Nearly two decades ago one of us (M.S.E.) initiated a revision and phylogenetic study of *Spino-*

TABLE 1
Summary of generic and subgeneric classification of Calliopsini
The distribution and approximate number of species are primarily based on Michener (2007), with modifications from Moure and DalMolin (2007), Gonzalez and Engel (2016), and taxa and synonyms established herein.

Genus/Subgenus	Species	Distribution
Genus *Acamptopoeum* Cockerell, 1905	11	Argentina, Chile to Colombia
Genus *Arhysosage* Brèthes, 1922	6	Argentina, Brazil, Paraguay
Genus *Calliopsis* Smith, 1853		
Subgenus *Calliopsima* Shinn, 1967	15	Canada to Mexico
Subgenus *Calliopsis* Smith, 1853	12	Canada to Panama
Subgenus *Ceroliopoeum* Ruz, 1991	1	Argentina
Subgenus *Hypomacrotera* Cockerell & Porter, 1899	4	USA, Mexico
Subgenus *Liopoeodes* Ruz, 1991	1	Argentina
Subgenus *Liopoeum* Friese, 1906	5	Argentina, Chile
Subgenus *Micronomadopsis* Rozen, 1958	20	USA, Mexico
Subgenus *Nomadopsis* Ashmead, 1898	13	Canada to Mexico
Subgenus *Perissander* Michener, 1942	7	USA, Mexico
Subgenus *Verbenapis* Cockerell & Atkins, 1902	4	USA, Mexico
Genus *Callonychium* Brèthes, 1922		
Subgenus *Callonychium* Brèthes, 1922	6	Brazil, Paraguay, Argentina
Subgenus *Paranychium* Toro, 1989	7	Argentina, Chile, Peru
Genus *Litocalliopsis* Roig-Alsina & Compagnucci, 2003	1	Argentina
Genus *Spinoliella* Ashmead, 1899	17	Argentina, Chile
Genus *Xeranthrena* Gonzalez & Engel, n. gen.	1	Peru

liella and at that time most of the species described as new herein were recognized, along with several others described by later authors in the intervening years (e.g., Rodríguez et al., 2001; Compagnucci, 2015). Among these was a particularly divergent species from Peru, initially thought to be an odd species of *Spinoliella* that not only expanded its distribution into Peru (e.g., Engel, 2000; Michener, 2000, 2007), but also that bridged the morphological gap between the two previously recognized subgenera (Toro and Ruz, 1972a). In order to understand the placement of this novel Peruvian species, we undertook a cladistic analysis of *Spinoliella* based on adult external morphological characters along with representatives of the other *Spinoliella*-group genera. Based on those results it is now apparent that the Peruvian species is best considered generically distinct from *Spinoliella*, and we therefore describe it here, along with those remaining new species of *Spinoliella* from Argentina and Chile, as an aid toward improving species-level identifications and circumscriptions for bees (Engel, 2011; Gonzalez et al., 2013a). In addition to describing and illustrating the new genus and five new species of *Spinoliella*, for the latter genus we also provide new geographical records, host plant associations, new diagnoses of all prior species, and an updated key to the entire group using novel morphological features (most earlier keys available for either Argentinean or Chilean species rely mostly on body color). We also provide an updated key to the genera of Calliopsini.

MATERIAL AND METHODS

The format for the descriptions generally follows that used by Gonzalez and Ruz (2007), Gonzalez and Engel (2011), and Gonzalez et al. (2013b), while morphological terminology follows that of Engel (2001, 2009) and Michener

(2007), except herein we use "torulus" instead of "antennal alveolus" as the former is in broader application across Hymenoptera. The abbreviations F, S, T, and OD are used for antennal flagellomere, metasomal sternum and tergum, and diameter of the median ocellus, respectively. Measurements were made with an ocular micrometer attached to an Olympus SZX-12 stereomicroscope. Measurements presented in the descriptions are for the holotype, with range values for paratypes in parentheses. Clypeal length was measured along the midline, while forewing length was taken from the apex of the humeral sclerite to the wing apical margin. Microphotographs were prepared using a Canon 7D digital camera attached to an Infinity K-2 long-distance microscope lens, and were assembled with the CombineZM™ software package. Final figure plates were processed with Adobe® Photoshop® 7.0. All primary types or type series for species of *Spinoliella* were examined, with the exception of *Spinoliella incudinotata* Compagnucci, *S. obscura* Compagnucci, *S. ruzi* Compagnucci, and *S. tadeyi* Compagnucci; for most of these exceptions, whose holotypes were not available, conspecific specimens were easily identified from material at hand. In total 19 (9♀♀, 10♂♂) specimens were available for the new genus, while we studied 1292 (503♀♀, 789♂♂) specimens of *Spinoliella*. In presenting label and locality data, we have reproduced information as it appears on each label, with double slashes (//) separating portions appearing on different labels attached to the same specimen. Annotations to clarify information as it appears on labels are indicated in brackets. The following institutional abbreviations were used for repositories holding specimens studied during the course of this work.

AMNH Division of Invertebrate Zoology, American Museum of Natural History, New York, New York (J.G. Rozen, Jr.)

BBSL Bee Biology and Systematics Laboratory, USDA-ARS, Utah State University, Logan, Utah (T.L. Griswold)

JSPC Jakub Straka Collection, Charles University in Prague, Prague, Czech Republic (J. Straka)

MACN Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, Argentina (A. Roig-Alsina)

MNHN Museo Nacional de Historía Natural, Santiago, Chile (M. Elgueta)

MSNT Museo Regionale di Scienze Naturali, Torino, Italy (G. Pagliano)

SEMC Division of Entomology (Snow Entomological Collection), University of Kansas Natural History Museum, Lawrence, Kansas (M.S.E.)

PCYU Packer Collection at York University, Toronto, Canada (L. Packer)

PUCV Pontificia Universidad Católica de Valparaíso, Chile (L. Ruz)

USNM Department of Entomology, National Museum of Natural History (United States National Museum), Smithsonian Institution, Washington, D.C. (R.J. McGinley, M. Mello, B. Harris)

ZMHB Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (M. Ohl)

Phylogenetic Analysis

To explore the relationships of the enigmatic Peruvian species described below, as well as those among species of *Spinoliella*, we coded and analyzed a data matrix of characters from adult external morphology. In total, we coded 82 characters for 23 species representing all known genera of Calliopsini (table 2). As the focus of our analysis was on the *Spinoliella* group, we used the results of Roig-Alsina and Compagnucci (2003) and considered as outgroups one representative each of the remaining genera in the tribe: *Acamptopoeum submetallicum* (Spinola), *Litocalliopsis adesmiae* Roig-Alsina and Compagnucci, and *Calliopsis* (*Calliopsima*) *rozeni* Shinn. The ingroup consisted of *Arhysosage flava* Moure, *Callonychium* (*Callonychium*) *mandibulare* (Fri-

TABLE 2

Data matrix for cladistic analysis of *Spinoliella*-group genera

The species *Acamptopoeum submetallicum* (Spinola), *Litocalliopsis adesmiae* Roig-Alsina and Compagnucci, and *Calliopsis* (*Calliopsima*) *rozeni* Shinn are used as outgroups for polarizing the character states, while the remaining taxa are ingroups representing *Arhysosage* Brèthes, *Callonychium* Brèthes, the diversity of *Spinoliella* Ashmead, and the new genus *Xeranthrena*. Refer to text for a description of characters and character states. Abbreviations: –, inapplicable; ?, unknown character state; * polymorphic (0, 1).

	1 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80
Acamptopoeum submetallicum	00000-0100000001000000000000100-1101011000000000000010100000000000000000111000100
Litocalliopsis adesmiae	01010-1100000011101000000000100-1101-1-00-0001010000101000000001001000000010100100
Calliopsis rozeni	0100100101000010001000000000100-1101011000001101000010000000010100201000010120100
Arhysosage flava	1110111001021110011000101101011O-1001011010001111111100-1111001001000010000001020110
Callonychium mandibulare	1111110000111110201O1-1100010001000001010100l-1111110110000001011111100100000121111
Spinoliella aidae	0101100001000110101O1-1100111101110111111111011111111011001000100100102111001000111
Spinoliella confusa	0101101001011110010O1-1100111101110111111111011100110110010011001000021110010000111
Spinoliella herbsti	01011010*001111001011-1100111101110111101111011100110110010011001000021110010000111
Spinoliella incudinotata	0001100000111000000011-11001111$0100111111101011100110110010011001001021110010000111
Spinoliella longirostris	0111100010100110011001111101010101001011-1010111111101100100111010010210001001111
Spinoliella maculata	0101100000100110101O1-1100111101000111111111011100111110010021001000021110010000111
Spinoliella nomadoides	0111100010100110010001111101012101001011110101111111011011100110100102111001001111
Spinoliella obscura	0111100011000110011001110101010101000010110101l??????????????????????110001000111
Spinoliella opaca	0001*0100010011001011-1100111101*1010111111101110011011001002100100002110001000111
Spinoliella packeri	0101100011111110011001111101010111001010110101110011011001010110100102110001021111
Spinoliella polita	0101100000010110111O1-1100111210101??????????1??????????????????????????????????
Spinoliella propinqua	0101100000110110010O1-1100111101*0011111111101110011111001001100100002111001000111
Spinoliella psamita	0111100010100110011001111101010111001010111101111111011001010110100102110001021111
Spinoliella rozeni	01011000001$*11001011-1100111101110111111111011100110110010021001000021110010000111
Spinoliella rufiventris	010110000*10011001101-1100111121010111111111011100l1*1100100210010000211100l000111
Spinoliella ruzi	01111000011$111000101-1100111121010111???11????111110110010021001000021110010000111
Spinoliella tadeyi	0111100011101110101O1-1100111101110110111111011111111011001000100100102111001000111
Xeranthrena imponticula	0111100000000111011001110001010110001110011001111101101101100001010010000010111001l

ese), the novel Peruvian genus and species, and all known species of *Spinoliella* (table 2). The majority of characters are binary (94%) and we used or modified 28 of the characters discussed by Ruz (1991). Although we coded more characters from the female ($n = 47$) than from the male, such difference is not significant (chi-square test X^2 (1, $n = 82$) = 1.76, $p = 0.19$), and thus this data set is not sex biased. For the female, about 45% of the characters were coded from the mesosoma, whereas 54% were coded from the metasoma in the male. Ten characters are based on color. The following are the descriptions of those adult external morphological characters used in the cladistic analysis:

Female characters

1. Gena: 0 = without maculation; 1 = with maculation.
2. Facial fovea: 0 = shallow, not forming a distinct groove; 1 = deep, forming a distinct groove.
3. Width of facial fovea: 0 = at least 0.6× minimum width of scape; 1 = at most 0.5× minimum width of scape.
4. Lower paraocular area (Ruz, 1991: char. 28): 0 = flat; 1 = distinctly swollen mesally next to clypeus (character state 1 is hereafter referred to as the "paraclypeal swelling").
5. Lower paraocular area: 0 = without maculation; 1 = with maculation.
6. Paraocular maculation: 0 = at most reaching one-half distance between upper margin of torulus and lower tangent of median ocellus; 1 = at least reaching lower tangent of median ocellus. Coded as inapplicable for species coded 0 for character 5.
7. Labrum: 0 = at most 1.8× longer than broad; 1 = at least twice as long as broad.
8. Apex of labrum (Ruz, 1991: char. 17): 0 = not inflexed; 1 = at least slightly inflexed.
9. Galea color: 0 = dark brown to black; 1 = yellow.
10. Pronotal lobe: 0 = without maculation; 1 = with maculation.
11. Sculpturing of mesoscutum: 0 = smooth and shiny among punctures; 1 = minutely punctate or alveolate, appearing strongly imbricate at low magnifications.
12. Mesoscutellum: 0 = black, without maculation; 1 = black, with yellow maculation along distal margin; 2 = entirely yellow.
13. Metanotum: 0 = without maculation; 1 = with maculation or entirely yellow.
14. Base of propodeum, in dorsal view: 0 = about as long as or shorter than metanotum; 1 = at least 1.6× longer than metanotum.
15. Sculpturing of base of propodeum (Ruz, 1991: char. 52): 0 = smooth and shiny; 1 = striate, rugose, or minutely areolate.
16. Forewing pterostigma with margin within marginal cell (Ruz, 1991: char. 45): 0 = straight or nearly so; 1 = convex.
17. Forewing marginal cell (Ruz, 1991: char. 46): 0 = longer than distance between its apex and wing tip; 1 = about as long as distance between its apex and wing tip; 2 = shorter than distance between its apex and wing tip.
18. Protibial spur (antennal cleaner) with rachis: 0 = short, at most half as long as malus; 1 = long, at least two-thirds length of malus.
19. Mesobasitarsus: 0 = elongate, at least 3.5× longer than wide; 1 = short, at most 3.2× longer than wide.

20. Metabasitibial plate: 0 = delimited by a strong border; 1 = not delimited by a strong border.
21. Disc of metabasitibial plate: 0 = covered with setae; 1 = not covered by setae.
22. Setae on metabasitibial plate: 0 = dense, obscuring integument; 1 = sparse, not covering entire surface. Coded as inapplicable for species coded 1 for character 21.
23. Keirotrichia of metatibia (Ruz, 1991: char. 62): 0 = forming a longitudinal dorsal or medial band on posterior surface of metatibia; 1 = present only at both ends of inner surface of metatibia.
24. Metatibial scopa (Ruz, 1991: char. 67): 0 = with moderately abundant setae; 1 = with extremely sparse setae.
25. Apex of outer (anterior) metatibial spur: 0 = straight or nearly so; 1 = distinctly curved.
26. Length of outer metatibial spur: 0 = at least 0.65× longer than inner metatibial spur; 1 = at most 0.62× longer than inner metatibial spur.
27. Metabasitarsus: 0 = short, at most 5.7× longer than broad; 1 = long, at least 6.0× longer than broad.
28. Posterodistal margin of metabasitarsus (Ruz, 1991: char. 70): 0 = distinctly projected; 1 = not projected.
29. Outer surface of metabasitarsus with setae: 0 = short, 2.5–3.0× longer than metabasitarsus width; 1 = long, at least 5.0× longer than metabasitarsus width.
30. Pretarsal claws (Ruz, 1991: char. 73): 0 = simple; 1 = cleft or bifurcate.
31. Coloration of terga: 0 = dark brown to black; 1 = yellow; 2 = light reddish brown to orange.
32. Maculation on T1–T4: 0 = absent; 1 = present.
33. T3 with maculation: 0 = broadly separated medially, gap between bands at least as long as transverse width of lateral band; 1 = continuous or narrowly broken, gap between bands at most one-half length of transverse width of lateral band.
34. Apical margins of T1–T4: 0 = concolorous with remainder of tergum; 1 = semi-translucent.
35. T1–T4 with distinct, apical setose bands (Ruz, 1991: char. 5): 0 = absent; 1 = present.
36. Pygidial plate: 0 = simple, not apically bifid or notched; 1 = apically bifid or notched.
37. S5 with median sclerotized area between gradulus and basal margin of sternum (Ruz, 1991: char. 88): 0 = absent; 1 = present.
38. Apical width of S6, as measured at level of setae: 0 = at most 0.5× anterior width of sternum, as measured between outer margins of apodemes; 1 = at least 0.6× anterior width of sternum.
39. S6 with basal, spinelike sclerotization (Ruz, 1991: char. 95): 0 = absent; 1 = present.
40. Proximal lobes of S6: 0 = short, not surpassing anterior margin of apodemes; 1 = long, surpassing anterior margin of apodemes.
41. S6 with narrow, sclerotized band between middle of proximal lobes and sternum: 0 = absent; 1 = present (Packer, 2004: fig. 6C).
42. Subapical setae on S6 (Ruz, 1991: char. 99): 0 = separated medially and thus forming two distinct, lateral patches; 1 = not separated medially, forming a continuous band.
43. Distal margin of S6: 0 = straight to gently projected medially; 1 = notched.
44. Reflexed layer of S6 (this is the same character referred to as "duplication" in Ruz, 1991: see Packer, 2004): 0 =

strongly sclerotized; 1 = weakly sclerotized.

45. Sting apparatus (Ruz, 1991: char. 127): 0 = developed; 1 = rudimentary.
46. Stylet of sting apparatus: 0 = long, surpassing gonostylus; 1 = short, not surpassing gonostylus.
47. Apex of stylet of sting apparatus (Ruz, 1991: char. 128): 0 = truncate; 1 = acute.

Male characters

48. Inner orbits of compound eyes: 0 = convergent below; 1 = subparallel or divergent below.
49. Facial fovea: 0 = shallow, not forming a distinct groove; 1 = deep, forming a distinct groove.
50. Width of facial fovea: 0 = at least 0.38× minimum width of scape; 1 = at most 0.33× minimum width of scape.
51. Antennal toruli (Ruz, 1991: char. 23): 0 = located at middle of face; 1 = located at lower one-third or one-fourth of face.
52. Anterior tentorial pit on outer subantennal sulcus (Ruz, 1991: char. 22): 0 = close to epistomal sulcus; 1 = at midpoint.
53. Clypeus with distal margin: 0 = straight or nearly so; 1 = distinctly projected medially. In *S. nomadoides* (Spinola) the distal margin of the clypeus is only faintly projected medially, and it was coded as having character state 0.
54. Disc of labrum (Ruz, 1991: char. 15): 0 = flat, without a transverse border; 1 = with a transverse ridge or carina delimiting basal area.
55. Ridge of labrum delimiting basal area: 0 = strong, forming a distinct carina; 1 = weak, barely visible.
56. Basal area of labrum (Ruz, 1991: char. 16): 0 = asetose; 1 = setose.
57. Mandible: 0 = normal, not arcuate; 1 = distinctly arcuate.
58. Mandible with distinct basal tooth or process on upper margin (Ruz, 1991: char. 18): 0 = absent; 1 = present.
59. Apex of mandible: 0 = simple, without a preapical tooth; 1 = with a preapical tooth or process. Note: The mandible of *S. nomadoides* has a small preapical process (Toro and Ruz, 1972a, 1972b), and this species was coded as having character state 1.
60. Hypostomal carina: 0 = not projecting anteriorly; 1 = projecting anteriorly. Character state 1 is found only in *S. psamita* Toro and Ruz and *S. packeri*, n. sp.
61. Metabasitibial plate: 0 = with all margins delimited by a strong border; 1 = delimited by a strong border at least posteriorly; 2 = not delimited by a border.
62. Keirotrichia of metatibia (Ruz, 1991: char. 63): 0 = on most of inner surface of metatibia; 1 = absent anteriorly and/or posteriorly and thus forming a longitudinal band.
63. Metabasitarsus: 0 = covered by long, sparse setae; 1 = densely covered by short, semierect setae.
64. Metasoma: 0 = straight, apex posteriorly directed; 1 = strongly curved down and forward at apex.
65. Pygidial plate (Ruz, 1991: char. 79): 0 = represented by bare, triangular, shiny area not delimited by carina; 1 = delimited by a distinct carina.
66. Discs of S2 and S3: 0 = unmodified, not swollen; 1 = modified, swollen.
67. S4 with patch of long, stiff, robust setae on disc medially: 0 = absent; 1 = present.
68. S5 with distal margin (Ruz, 1991: char. 84): 0 = broadly concave; 1 = straight; 2 = with an elongate median projection.
69. Apodemes of S7 (Ruz, 1991: char. 70, fig. 29D): 0 = forming an inverted V or

U; 1 = transverse, not forming an inverted V or U.

70. Body of S8: 0 = rectangular; 1 = elongate; 2 = triangular or nearly so.
71. Median process of S8: 0 = abruptly separated from main body of sternum; 1 = gradually separated from main body of sternum.
72. Apex of median process of S8: 0 = distinctly expanded (clavate, capitate, or arrow-shaped); 1 = not distinctly expanded.
73. Gonocoxite: 0 = square or rectangular; 1 = elongate.
74. Dorsomedial projection of gonocoxite: 0 = absent; 1 = present.
75. Volsella (Ruz, 1991: char. 118): 0 = absent; 1 = present.
76. Gonostylus (Ruz, 1991: char. 115): 0 = absent or rudimentary; 1 = present and fully developed.
77. Penis valves: 0 = fused medially by a narrow bridge; 1 = separated.
78. Penis valves: 0 = shorter than gonocoxite in ventral view; 1 = about as long as gonocoxite; 2 = longer than gonocoxite.
79. Apex of penis valve: 0 = simple, not divided into lobes; 1 = bifid, with distinct, large ventral and dorsal lobes. In most species of *Spinoliella*, such as *S. confusa*, there is a dorsal, weakly sclerotized, laminar projection at the apex of the penis valve. Such a projection is distinct from the dorso-ventral lobe found in *S. nomadoides*. We coded these species with a laminar projection as having character state 0.
80. Setae on apex of penis valve: 0 = absent; 1 = present.
81. Penis (Ruz, 1991: char. 125): 0 = separated from penis valve; 1 = partially or completely fused to penis valve.
82. Penis with internal sclerotization (Ruz, 1991: char. 126): 0 = absent; 1 = present.

The data matrix was constructed in WinClada (Nixon, 1999), and submitted from there for parsimony analyses in TNT (Goloboff et al., 2003, 2008). All characters were treated as nonadditive and equally weighted. Tree search in TNT was done by implementing sectorial searches with tree drifting (TD) and tree fusing (TF), and ratchet runs with TD and TF. We used the following search: keep a maximum of 10,000 random trees, 500 random addition sequences, and 1000 ratchet iterations, including 100 cycles of TD and 100 rounds of TF per iteration. Branch robustness was estimated with 10,000 bootstrap replicates (Felsenstein, 1985) and absolute Bremer support (Bremer, 1994) in TNT. The latter search was done by withholding 10,000 suboptimal trees up to 10 steps longer than the parsimonious trees and plotting the values on the strict consensus topology obtained from the final TNT parsimony run. Trees were visualized and printed in WinClada, collapsing unsupported nodes and using DELTRAN (slow) for character optimization; the latter favors, when the choices are equally parsimonious, repeated origins of characters over reversals. The abbreviations L, CI, and RI are used for tree length, consistency index, and retention index, respectively, when reporting descriptive statistics of tree topologies.

PHYLOGENETIC RESULTS

The analysis of the data matrix yielded four equally parsimonious trees (L= 186, CI = 47, RI = 67); three nodes collapsed in the strict consensus topology. *Arhysosage* resulted as the sister group of an unresolved clade containing *Callonychium*, *Spinoliella*, and the new genus. Within *Spinoliella* two clades corresponding to the previously recognized subgenera were recovered; a small clade consisting of five species (*S. longirostris* Toro, *S. nomadoides*, *S. obscura*, *S. packeri*, and *S. psamita*) that corresponds to the nominate

subgenus, and a large clade containing the remaining species corresponding to the former subgenus *Peniella* Toro and Ruz. When the three species of *Spinoliella* with some missing data, namely *S. obscura*, *S. ruzi*, and *S. polita*, n. sp., were excluded from the analysis, three shorter equally parsimonious trees were obtained (L= 174, CI = 51, RI = 68), and five nodes collapsed in the consensus with most branches having moderate to low support (fig. 1). *Arhysosage* remained in the same position, whereas the new genus was recovered as the sister group to the clade comprising *Callonychium* and *Spinoliella*; the relationships among the species of *Spinoliella* remained the same. The following unambiguous putative synapomorphies support the clade containing the new genus: female metabasitibial plate covered with sparse setae on disc (22-1); metatibial scopa consisting of extremely sparse setae (24-1); metasomal terga with yellow or cream maculation (32-1); S6 of female apically broad, at least 0.6× anterior width of sternum (38-1); labrum with ridge delimiting basal area weak, barely visible (55-1); and male penis with internal sclerotization (82-1). The monophyly of *Spinoliella* was supported by the following unambiguous putative synapomorphies: S6 of female with narrow sclerotized band between middle of proximal lobes and sternum (41-1); S6 of female with reflexed layer weakly sclerotized (44-1); S8 of male with body triangular or nearly so (70-2); and median process of male S8 gradually separated from its body (71-1). While no unambiguous synapomorphies support the monophyly of the small clade corresponding to the former subgenus *Spinoliella* s.str., the following three unambiguous synapomorphies support its sister clade (former subgenus *Peniella*): female metabasitarsus long, at least 6.0× longer than broad (27-1); female metabasitarsus with outer surface covered by long setae, at least 5.0× longer than metabasitarsus width (29-1); and female pygidial plate bifid (36-1).

SYSTEMATICS

Tribe Calliopsini Robertson

Calliopsinae Robertson, 1922: 160. Type genus: *Calliopsis* Smith, 1853. Michener, 1997: 62; Engel, 2005: 7.

Diagnosis: Body frequently somewhat robust; integument not metallic and usually with yellow or cream-colored areas. Anterior tentorial pit in outer subantennal sulcus. Episternal groove short, arching into scrobal groove and not extending below latter; forewing with two submarginal cells. Female S5 with distal margin convex medially; S6 with curved marginal band of dense setae, sometimes broken medially; proximally with two broad, membranous lobes occupying space between apodemes. Male gonostylus absent or reduced to small setose projection or area; penis valve enlarged and of complex form; gonocoxa large, subglobose, and convex.

Comments: The genera of Calliopsini were last revised by Ruz (1991), with additions by Roig-Alsina and Compagnucci (2003) and the new taxon described here. The current supraspecific classification is outlined in table 1.

Key to Genera of Calliopsini

(Modified from Michener, 2007)

Females

1.Labrum with basal area excavated, distal part convex, protuberant in lateral view; inner orbits of compound eyes generally convergent below, or, if not, then lower paraocular area not swollen mesally.....2

–Labrum flat or with smooth, rounded, nearly transverse ridge, distal area flat; inner orbits of compound eyes subparallel or divergent below and lower paraocular area swollen mesally.....4

2(1)Labrum with basal area pilose at least laterally, its distal margin strongly salient; metatibia with keirotrichia widespread on most of inner surface (South America).....3

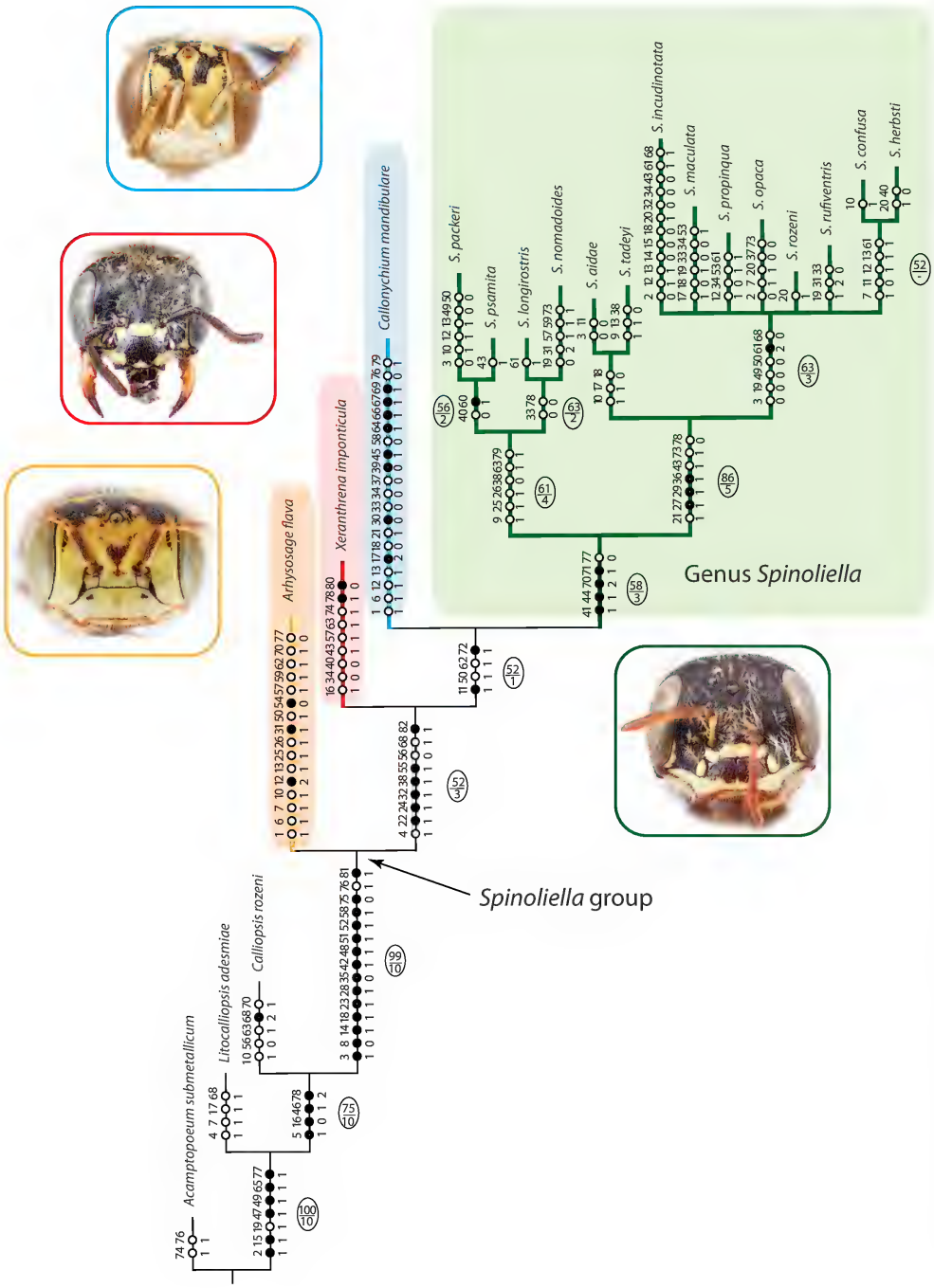

FIGURE 1. Cladistic placement of *Xeranthrena* Gonzalez and Engel, new genus, among other Calliopsini (Panurginae), particularly within the "*Spinoliella* group"; strict consensus of three equally parsimonious topologies obtained after excluding three species of *Spinoliella* with missing data (refer to text). Black circles indicate unique character changes; white circles indicate homoplastic changes; character numbers are placed above each change, character state below. Branch support indicated in circles, with bootstrap values above bar and Bremer values below. Branches without support values indicate bootstrap values below 50% and Bremer values of 1.

–Labrum with basal area usually glabrous, but if pilose, then flat (without ridge); metatibia with keirotrichia absent toward ventral margin to completely absent between basal and distal patches (Canada to Panama; Argentina, Chile).....*Calliopsis* Smith

3(2)Lower paraocular area mesally (immediately above sublateral concavity in upper clypeal margin) swollen and impunctate; apical setose bands of T1–T4 with setae short, scarcely surpassing tergal margins, and directed posterolaterally (Argentina).....*Litocalliopsis* Roig-Alsina and Compagnucci

–Lower paraocular area mesally not or weakly swollen, sometimes with small, impunctate area; apical setose bands of T1–T4 with setae long, surpassing tergal margins, directed posteriorly (Argentina and Chile to Colombia and Venezuela).....*Acamptopoeum* Cockerell

4(1)Inner orbits of compound eyes divergent below; metasoma wider than mesosoma; meso- and metatibial spurs strongly curved at apices; lower paraocular area convex (Argentina, Brazil, Paraguay).....*Arhysosage* Brèthes

–Inner orbits of compound eyes subparallel; metasoma about as wide as mesosoma or narrower; meso- and metatibial spurs variable, strongly curved at apices to straight or nearly so; lower paraocular area strongly convex only on inner corner.....5

5(4)Gena with longitudinal yellow band to completely yellow; lower paraocular area with yellow spot, which is narrowed and extended upward along upper orbit of compound eye; lower margins of toruli usually at lower one-fourth of face; pretarsal claws simple; facial fovea linear (Argentina, Brazil, Chile, Paraguay, Peru).....*Callonychium* Brèthes

–Gena black, without maculation; lower paraocular area with yellow not extending upward as narrow band along orbit of compound eye; lower margin of toruli at lower one-third of face; pretarsal claws bifurcate; facial fovea variable, linear to broad and sinuous.....6

5(4).Clypeus preapically despressed on disc, with distinct, elevated apical ridge medially, its distal margin with low projection near lateral margin of labrum; disc of mesoscutum uniformly and densely punctate, punctures separated by 1–2× a puncture width or less, smooth and shiny among punctures; pygidial plate simple, not bifid (Peru).....*Xeranthrena* Gonzalez and Engel, n. gen.

–Clypeus distinctly protuberant to somewhat flat on disc, without a distinct, elevated prepical ridge, its distal margin with strong projection near lateral margin of clypeus; disc of mesoscutum finely and contiguously punctate-alveolate among large, sparse setiferous punctures, if smooth and shiny, then punctures not uniformly distributed and more widely separated; pygidial plate variable, simple or bifid (Argentina, Chile).....*Spinoliella* Ashmead

Males

1.Inner orbits of compound eyes convergent below; anterior tentorial pit clearly below middle of outer subantennal sulcus.....2

–Inner orbits of compound eyes subparallel or divergent below; anterior tentorial pit near middle of outer subantennal sulcus.....4

2(1)Metasomal T7 with median smooth area distally, area delimited by setae and tapered at apex (S4 and S5 with distal margins straight or nearly so, without median projections) (Argentina and Chile to Colombia and Venezuela).....*Acamptopoeum* Cockerell

–Metasomal T7 with pygidial plate apex rounded or truncate, usually delimited by ridges or carinae laterally.....3

3(2)Metasomal S4 with distal margin usually produced in middle, its surface broadly concave mesally; S5 with median projection (sometimes inconspicuous) on distal margin (Canada to Panama; Argentina, Chile).....*Calliopsis* Smith

–Metasomal S4 and S5 unmodified, transverse, without projections or concavity (Argentina)..... ...*Litocalliopsis* Roig-Alsina and Compagnucci

4(1)Compound eye orbits strongly divergent below; lower paraocular area flat; most of body yellow; metatibial spurs strongly curved; metasoma much wider than head (Argentina, Brazil, Paraguay)..... .....*Arhysosage* Brèthes

–Compound eye orbits usually subparallel, but if not, then lower paraocular area greatly swollen mesally; body with yellow markings but usually predominantly black; inner metatibial spur almost straight, outer spur straight or somewhat curved; metasoma as broad as head.....5

5(4)Metasoma at apex strongly curved downward and forward; discs of exposed sterna usually modified, with protuberances, projections, ridges, or carinae; paraocular area with yellow surpassing level of antennal torulus, usually narrowly following orbit; clypeus (in ventral view) with inner margin of lateral area beside lateral margin of labrum usually almost straight; toruli (lower margin) usually at lower quarter of face (Argentina, Brazil, Chile, Paraguay, Peru).... .....*Callonychium* Brèthes

–Metasoma at apex slightly curved or straight; discs of exposed sterna unmodified; paraocular area yellow only on lower part; clypeus (in ventral view) with projection or convexity of lateral, downward-directed part beside lateral margin of labrum; toruli (lower margin) usually at lower third of face 6

6(5)Apex of antennal scape in repose nearly reaching lower margin of median ocellus; S8 with body rectangular, median process abruptly separated from body, apically expanded; gonocoxite dorsomedially with distinct, acute process; penis valve not connected dorsally by bridge, apically broad, asetose, not divided into lobes (Peru)..... .....*Xeranthrena* Gonzalez and Engel, n. gen.

–Apex of antennal scape reaching at most two-thirds of distance between upper margin of torulus and lower margin of median ocellus; S8 with body triangular or nearly so, median process gradually separated from body, apically not expanded; gonocoxite dorsomedially without a projection; penis valve dorsally connected by bridge, apically narrow, setose, with small to large dorsal membranous lobe (Argentina, Chile).....*Spinoliella* Ashmead

Xeranthrena Gonzalez and Engel, new genus

Type species: *Xeranthrena imponticula* Gonzalez and Engel, new species.

Diagnosis: The new genus is most similar to *Spinoliella* but can be easily separated by the following combination of characters: female clypeus with low projection on distal margin near lateral margin of labrum (fig. 2B, C), preapically depressed on disc, with elevated apical ridge medially (with strong projection, convex on disc, and without distinct ridge in *Spinoliella*); female S6 with proximal lobes about as long as apodemes (fig. 2I) (surpassing apodemes in *Spinoliella*); male S8 with body rectangular, abruptly separated from apically expanded median process (fig. 3G) (body triangular, gradually separated from median process, not apically expanded in *Spinoliella*); penis valve apically simple, asetose, not fused dorsally by bridge (fig. 3H, I) (apically bifid, setose, fused medially by bridge in *Spinoliella*); and male metatibia with keirotrichia occupying entire inner surface (absent anteriorly in *Spinoliella*).

Description: **Female.** Moderate-sized bees (7–10 mm in length); color dark brown to black, with yellow maculation on mandible, face, pronotum, and metasomal terga (fig. 2A–D, H); integument largely smooth and shiny between punctures, especially on dorsal surface of mesosoma; punctures finer on metasoma; pubescence whitish, sparse, longer and denser on head and mesosoma than on metasoma; metasomal terga and sterna covered by minute, appressed setae. Head broader than long, broader than meso-

soma; mandible edentate, pointed, with strong basal process on upper margin; labrum with weak ridge bordering glabrous, impunctate, basal area; clypeus more than 3× broader than long, distal margin with low projection near lateral margin of labrum; labrum broader than long, asetose basal area delimited by weak border, apex not inflexed; lower mesal paraocular area distinctly swollen (fig. 2B); anterior tentorial pit at midpoint of outer subantennal sulcus; lower margins of antennal toruli at lower one-third of face; facial fovea well-marked, narrow; inner orbits of compound eyes parallel (fig. 2A); lower margin of median ocellus below upper orbital tangent; vertex convex; gena slightly narrower than compound eye in profile, widest medially. Labiomaxillary complex of moderate length, not distinctly elongate; maxillary palpus with six palpomeres, apical three palpomeres each shorter than basal three individually; labial palpus with four palpomeres, first palpomere much longer than combined lengths of remaining palpomeres, second palpomere slightly longer than third and fourth palpomeres individually; glossa slightly shorter than prementum.

Pronotal collar rounded, not carinate; dorsal surface of propodeum microareolate, asetose, gently sloping, 1.6× longer than metanotum. Forewing with pterostigma more than 3× longer than broad, about as wide as prestigma, margin basal to r-rs slightly divergent from C, that within marginal slightly convex; marginal cell obliquely and broadly truncate at apex, appendiculate, longer than distance from its apex to wing tip; two submarginal cells, first submarginal cell slightly longer than second; basal vein (1Rs+M) gently curved; 1m-cu distal to 2Rs (i.e., second free abscissa Rs, or "first submarginal crossvein" sensu Michener, 2007); 2m-cu basal to 2rs-m ("second submarginal crossvein" sensu Michener, 2007); jugal lobe 0.9× length of vannal lobe. Hind wing with second abscissa of M+Cu about 3.8× length of cu-a; 10–12 distal hamuli. Legs unmodified; mesotibial spur ciliate, straight, about one-half mesobasitarsal length; metabasitibial plate spatulate, slightly concave on disc, delimited by strong border (fig. 2F), with scattered, semierect, short, stiff setae basally; metatibia 1.7× longer than metabasitarsus, with keirotrichia on inner surface present only at both ends, scopa on outer surface with extremely sparse, mostly unbranched setae except minutely branched on posterior margin basally; metatibial spurs ciliate, straight, inner spur about 1.3× longer than outer spur; metabasitarsus not projecting on posterodistal margin; pretarsal claws cleft, with outer ramus longer than inner.

Metasoma broader than mesosoma; terga without apical bands of setae (fig. 2G); T2 with well-marked lateral fovea; T7 with pygidial plate apically simple, pointed; S6 with proximal laminar lobes not surpassing anterior margin of apodemes, reflexed layer ("duplication" sensu Ruz, 1991) strongly sclerotized, broadly convex, subapically with dense, continuous band of setae, distal margin concave medially (fig. 2I); sting apparatus developed, with stylet apically acute, not surpassing gonostylus.

Male. Antennal scape unmodified, nearly reaching lower margin of median ocellus (fig. 3A); flagellum shorter than head; inner orbits of compound eyes weakly to strongly divergent ventrally (fig. 3A). Outer surfaces of pro- and mesotibiae apically with small, posterior spine; keirotrichia occupying entire inner surface of metatibia. Metasoma straight, with apex posteriorly directed; sterna unmodified; S5 with distal margin straight; S6 medially projected on distal margin; S7 with apodemes forming a broad, inverted V, apically with two large lobes (fig. 3F); S8 with body rectangular, abruptly separated from apically expanded median process (fig. 3G); gonocoxite square or nearly so, ventrally completely fused on midline, with strong dorsomedial projection distally; gonostylus vestigial, about one-eighth of gonocoxite length in ventral view (fig. 3H); volsella indistinct, presumably represented by sclerotized, digitiform area fused to gonocoxite and gonostylus, as seen in ventral view (fig. 3H); penis valve free, not fused medially by narrow bridge (fig. 3H), apically simple, asetose, weakly sclerotized, laterally compressed (fig. 3H, I); penis fused to penis valve, partially sclerotized.

FIGURE 2. Female holotype of *Xeranthrena imponticula* Gonzalez and Engel, new species. **A.** Facial view. **B.** Detail of clypeus. **C.** Head in lateral view. **D.** Dorsal habitus. **E.** Detail of mesoscutum and mesoscutellum in dorsal view. **F.** Metabasitibial plate. **G.** Metasoma in dorsal view. **H.** Lateral habitus. **I.** Metasomal S6 in ventral view.

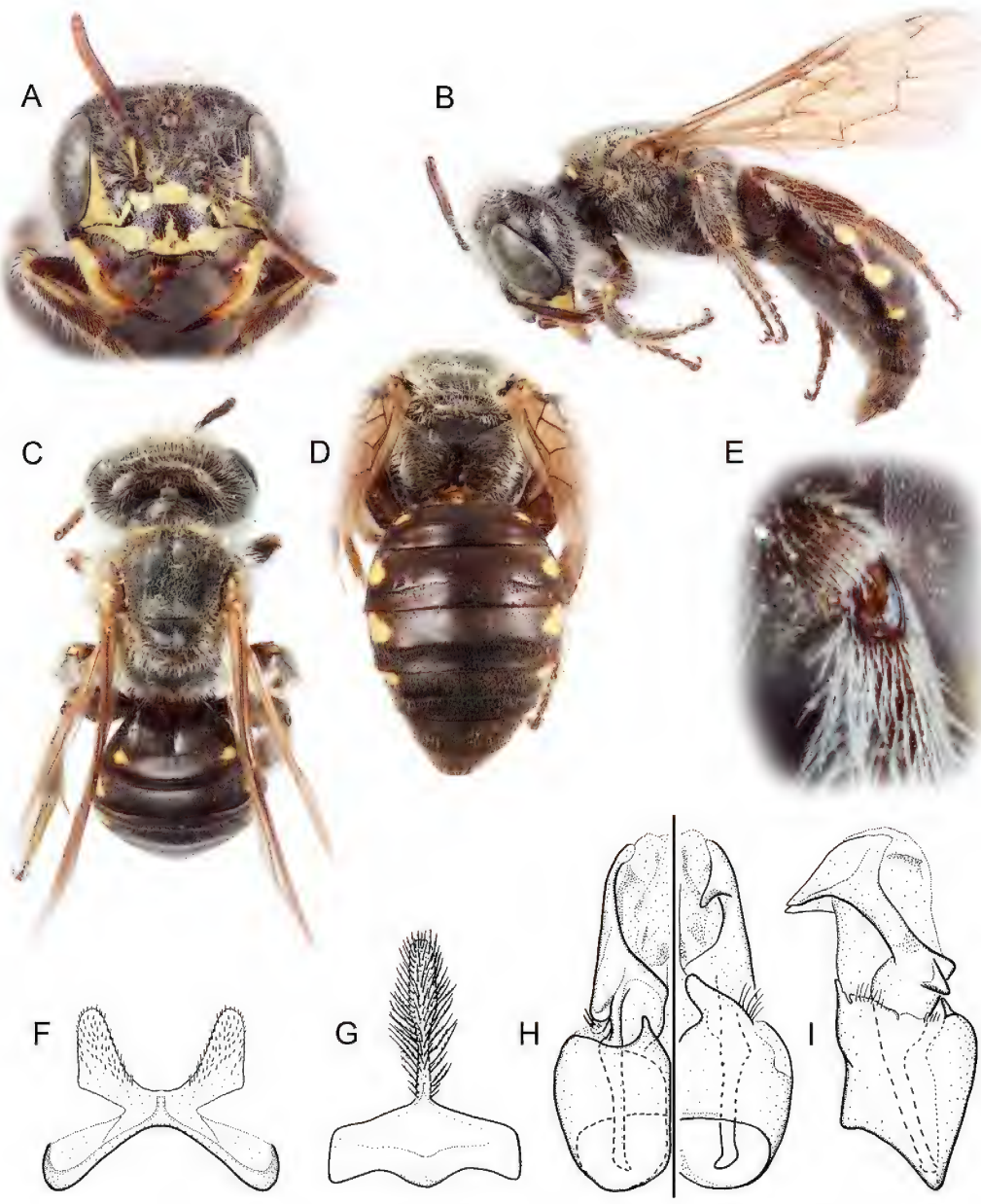

FIGURE 3. Male paratype of *Xeranthrena imponticula* Gonzalez and Engel, new species. **A.** Facial view. **B.** Lateral habitus. **C.** Dorsal habitus. **D.** Metasoma in dorsal view. **E.** Metabasitibial plate. **F.** Metasomal S7. **G.** Metasomal S8. **H.** Genital capsule in dorsal (left half) and ventral (right half) views. **I.** Lateral aspect of genital capsule.

ETYMOLOGY: The new genus-group name is a combination of *xeros* (Greek, "dry," referring to the xeric regions inhabited by these bees), and *anthrene* (Greek, "wild bee"). The gender of the name is feminine.

Xeranthrena imponticula Gonzalez and Engel, new species

Figures 2, 3

DIAGNOSIS: In addition to the generic characters indicated above, this species can be recognized by the simple, not bifid, pygidial plate. In this latter regard, the female is superficially similar to *S. obscura*, a species that also shares with *X. imponticula* a straight outer metatibial spur. *Xeranthrena imponticula* can be further separated from *S. obscura* and other species of *Spinoliella* by the following combination of characters: larger body size (7–10 mm); frons, mesoscutum, mesoscutellum, and discs of terga smooth and shiny, uniformly punctate (e.g., fig. 2E), with punctures separated by a puncture width or less; propodeum dull, densely and contiguously punctate; forewing with pterostigma with sides diverging distally and with the margin within the marginal cell convex; male S2–S5 with discs densely covered by short, appressed setae as those on tergal discs, without distinct band of long, erect setae; and shape of male S7, S8, and genital capsule (fig. 3F–I).

DESCRIPTION: **Female.** Total body length 8.7 mm (7.3–8.7 mm); forewing length 5.3 mm (4.6–5.3 mm); head width 2.5 mm (2.1–2.5 mm). Head 1.3× wider than long; inner orbits of compound eyes parallel; intertorular distance about 3× OD, 1.4× greater than torulorbital distance; torulus diameter about equal to OD; ocellocular distance 2.6× OD, 1.2× greater than ocelloccipital distance; interocellar distance 2.4× OD, slightly shorter (0.9×) than ocellocular distance; compound eye 2.2× longer than wide; clypeus 3.2× broader than long, preapically slightly depressed on disc, with apex surpassing inferior tangent of compound eyes by about half of its length, projected about 0.5× compound eye width in lateral view; gena 0.9× width of compound eye in profile, widest medially; inner subantennal sulcus about 0.7× length of outer subantennal sulcus; facial fovea long, deep, forming a groove, 13× longer than broad, about same width (0.3× width of scape) across its length, 1.1× longer than scape; scape 3.4× longer than broad; pedicel about as long as F1, about as long as broad; F1 slightly longer than broad, 1.5× longer than F2 and F3 individually; remaining flagellomeres broader than long, except last flagellomere longer than broad. Protibial spur with apical portion of rachis about as long as length of malus, with row of 10 elongate branches (not including apical portion of rachis); mesobasitarsus robust, about 2.8× longer than broad; metatibia 4.2× longer than broad; metabasitarsus 5.0× longer than broad, about 0.6× length of metatibia.

Body color black except dark reddish brown on mandible apically, antennal flagellum, legs, and metasoma. Yellow maculation as follows: mandible basally; clypeus laterally and medioapically; supraclypeal area; lower paraocular area including paraclypeal swelling (nearly absent in one paratype); subantennal area; dorsal surface of pronotum laterally; outer surfaces of pro- and mesotibiae basally; T1–T5 each with lateral maculation, gap between maculation narrower on T3 and T4. Tegula semitranslucent brownish; wing membranes brownish with weak green and copper highlights; veins, prestigma, and pterostigma light to dark brown.

Body pubescence whitish except off-white on vertex and metasoma, and light reddish brown on inner surfaces of tarsi. Head and mesosoma with minutely branched setae denser on frons and mesoscutum, integument largely visible among setae; mesoscutum and mesoscutellum with long (1.0–1.5× OD), sparse, erect setae arising among shorter, denser, appressed setae. Metasoma covered by minute, appressed, sparse setae, with semierect, long (1.0–1.5× OD), scattered setae on discs of sterna, sides of terga, and discs of T4 and T5, setae longer and denser on apical terga.

Outer surface of mandible except basally and basal one-third of labrum smooth and shiny, impunctate; clypeus smooth and shiny, with faint punctures separated by 1.0–2.0× a puncture width, punctures smaller and denser laterally; paraclypeal swelling impunctate; subantennal, supraclypeal, and lower paraocular areas smooth and shiny with smaller, fainter punctures than on clypeal disc, punctures separated by 1.0–2.0× a puncture width; remaining areas of face uniformly punctate, punctures coarser and denser than on disc, integument otherwise smooth and shiny; vertex behind ocelli with weakly imbricate integument among oval punctures; gena minutely punctate, punctures denser near orbital margin, scattered, larger on hypostomal area, integument otherwise smooth and shiny. Mesosoma, including legs, smooth and shiny among punctures except strongly imbricate on metepisternum and sides of propodeum, finely alveolate on propodeal triangle, and coarsely alveolate on posterior surface of propodeum; mesoscutum and mesoscutellum densely and uniformly punctate, punctures separated by a puncture width or less; metanotum with denser punctures than on mesoscutellum; mesepisternum with denser, fainter, and larger punctures than on mesoscutum, punctures sparser dorsally. Metasomal terga and sterna uniformly and minutely punctate, weakly imbricate among punctures.

Male. As in female except pubescence slightly longer and denser, and in following features: total body length 7.0–10.1 mm; forewing length 4.6–5.7 mm; head width 2.2–2.9 mm. Head 1.3–1.4× wider than long; mandible arcuate; intertorular distance 2.8× OD, 1.2× greater than torulorbital distance; torulus diameter 0.9× OD; ocellocular distance equal to ocelloccipital distance; clypeus 3.6× broader than long, projected about 0.4× compound eye width in lateral view; gena about as wide as compound eye in profile; facial fovea shallower than in female, 7.0× longer than broad, 0.7× length of scape; scape 3.0× longer than broad; pedicel slightly shorter than F1; F1 1.6× longer than F2 and F3 individually. Metatibia 3.7× longer than broad; metabasitarsus 4.5× longer than broad; mesobasitarsus slender, 5.4× longer than broad. Metasomal S7, S8, and genital capsule as in figure 3F–I.

Body color as in female except yellow on: labrum, clypeus except basally on disc, anterior surface of scape (sometimes reduced) (fig. 3A, C), apices of pro- and mesofemora, and outer surface of protibia (sometimes reduced). Metasomal T1–T5 each with lateral yellow maculation smaller than in female (sometimes reduced to absent on T2) (fig. 3B, D).

Holotype: ♀, Peru: Lima Dept., 15 km WSW Sayán, V-12-1996 [12 May 1996], J.G. Rozen, A. Ugarte, & M. Laime // On *Exodeconus prostratus* (AMNH).

Paratypes (n = 8♀♀, 10♂♂): Peru: **Lima Province:** 2♀♀, 1♂ with same data as holotype (AMNH); 1♀ with same data as holotype but collected on V-11-96 [11 May 1996] (AMNH); 1♀, 3♂♂, Lima Dept., 15 km WSW Sayan, VI-26–28-95 [26–28 June 1995], J.G. Rozen, A. Ugarte // On *Exodeconus maritimus* (1♀, 1♂ AMNH, 2♂♂ SEMC); 1♀, same as previous except VI-27-95 [27 June 1995] (AMNH); **La Libertad Province:** 1♀, 1♂, La Libertad Dept., La Gloria, 7.5 km, NNW Paiján, V-23-96 [23 May 1996], J.G. Rozen & A. Ugarte // On *Exodeconus prostratus* (1♂ AMNH, 1♀ SEMC); 1♂, Chile [sic, Peru], La Libertad Pr. 31 km E Trujillo, 21 Mar 1999, J.G. Rozen, A. Ugarte (AMNH); **Ancash Province:** 1♀, 1♂, Ancash Prov., 21 km E Casma, 9°28′92″S, 78°06′97″W, el. 2000′ III-20-1999 [20 March 1999] // on plant #5 // J.G. Rozen, A. Ugarte // SEMC 1008502, 1008504 (SEMC); 1♀, 1♂, same as previous except Yaután, 9°31′69″S, 72°99′22″W, III-20-1999 [20 March 1999], J.G. Rozen, A. Ugarte // on plant #5 // SEMC 1008501, 1008503 (SEMC); 2♂♂, same as previous except 9°31′S, 77°99′W, 20 Mar 1999, Rozen, Ugarte (AMNH).

Etymology: The specific epithet is a combination of *im-* (Latin, "without") and *ponticulus* (Latin, diminutive of "bridge"), and is a reference to the lack of a dorsal bridge to the penis valves.

Distribution: This species is known only from the xeric areas along the Pacific slope of the Andes in central and northern Peru.

Floral associations: *Exodeconus prostratus* (L'Hér.) Raf. and *E. maritimus* (Benth.) D'Arcy (Solanaceae).

Comments: The collection locality indicated for one of the male paratypes as "Chile, La Libertad Pr. 31 km E. Trujillo" is clearly a typographical error because both La Libertad Province and its capital, Trujillo, are in Peru.

Genus *Spinoliella* Ashmead

Spinoliella Ashmead, 1899: 84. Type species: *Camptopoeum nomadoides* Spinola, 1851, monobasic and by original designation.

Spinoliella (*Peniella*) Toro and Ruz, 1972a: 146. Type species: *Camptopoeum maculatum* Spinola, 1851, by original designation. Synonymy after Michener (2000).

Diagnosis: *Spinoliella* are most similar to *Callonychium* owing to the subparallel inner margins of the compound eyes and yellow markings on otherwise darker integument. *Spinoliella* can be differentiated from *Callonychium* by the absence of maculation on the genae (with a longitudinal yellow band in *Callonychium*), cleft pretarsal claws in females (simple in *Callonychium*), and antennal toruli positioned in lower third of face (in lower fourth of face in *Callonychium*). Both genera can be separated from the related genus *Arhysosage* by the presence in the latter genus of ventrally divergent compound eyes, a broad metasoma (wider than mesosoma and sometimes wider than head: see Engel, 2000), and strongly incurved meso- and metatibial spurs in females.

Distribution and floral associations: The genus is confined to Argentina and Chile (tables 1 and 3); individuals of 12 of the known species have been found at a wide variety of flowers (table 4), although it is unknown whether these were to collect pollen or merely imbibe nectar. Considerable work is needed on the biology of *Spinoliella* in association with their flowers.

Comments: *Spinoliella* are currently known from Argentina and Chile, although at least one species is known from no more than 35 km south of the Peruvian border and it is likely that the genus will be found in that country. The genus was revised by Toro and Ruz (1972a, 1972b) who initially recognized six species and two subgenera. *Spinoliella longirostris*, *S. nomadoides*, and *S. psamita* were grouped in the nominate subgenus, while the remaining species were placed in subgenus *Peniella*. Both subgenera were further characterized by Ruz (1991) and, although they can be recognized on the basis of morphological characters in both sexes, Michener (2000, 2007) considered them unnecessary given the small number of species and that they are not very distinct from each other. Subsequent to Toro and Ruz's (1972a, 1972b) account, several species have been described (Toro, 1995; Rodríguez et al., 2001; Compagnucci, 2015), bringing the diversity known prior to the present work to a total of 13 species (table 2), although one is newly synonymized herein. Of these additional species, all were ascribed to one of the two subgenera except for the four Argentinean species described by Compagnucci (2015), as they appeared to intermingle characters from both subgenera. Although our analysis supported the two subgenera as monophyletic, the distinctions remain minor and we do not advocate their reinstatement at this time.

Key to Species of *Spinoliella*

Females

1. Apex of pygidial plate narrowly rounded or truncate, not bifid.....2
– Apex of pygidial plate bifid.....6
2(1) Outer metatibial spur straight or nearly so, about same thickness and with similar fine branches as on inner spur; mesoscutum and mesoscutellum largely impunctate, with few, scattered punctures (Argentina)..... .....*S. obscura* Compagnucci

TABLE 3

Diversity and distribution of Species of *Spinoliella* Ashmead

A summary of currently included species in *Spinoliella* Ashmead, including the new species described herein. In summarizing distributions, we provide the name for principal regions (with official numerical designations in parentheses) for Chile, and provinces for Argentina. More precise locality information is given under the individual species accounts in the text.

Species	Elevation (m)	General distribution
S. aidae Gonzalez, Smith-Pardo, and Engel, n. sp.	~500–1300	Argentina: Catamarca, La Rioja
S. confusa Gonzalez and Engel, n. sp.	70–2500	Chile: Atacama (R-III), Coquimbo (R-IV)
S. herbsti (Friese, 1916)	8–990	Chile: Coquimbo (R-IV), Valparaíso (R-V)
S. incudinotata Compagnucci, 2015	—	Argentina: Catamarca, La Pampa, Mendoza, Neuquén, Río Negro, Salta
S. longirostris Toro, 1995	300–2771	Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III)
S. maculata (Spinola, 1851)	11–900	Chile: Coquimbo (R-IV), Valparaíso (R-V), Maule (R-VII), Región Metropolitana (R-M)
S. nomadoides (Spinola, 1851)	300–800	Chile: Atacama (R-III), Coquimbo (R-IV), Bío Bío (R-VIII)
S. obscura Compagnucci, 2015	—	Argentina: Catamarca, San Juan
S. opaca Rodríguez, Toro, and Ruz, 2001	11–990	Chile: Atacama (R-III), Coquimbo (R-IV)
S. packeri Gonzalez and Engel, n. sp.	1935–3255	Chile: Tarapacá (R-I), Antofagasta (R-II), Arica and Parinacota (R-XV)
S. polita Gonzalez and Engel, n. sp.	800	Chile: Maule (R-VII)
S. propinqua Gonzalez and Engel, n. sp.	1359–1900	Chile: Maule (R-VII)
S. psamita Toro and Ruz, 1972a	16–2358	Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV)
S. rozeni Toro and Ruz, 1972a	11–1716	Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV)
S. rufiventris Toro and Ruz, 1972a	127–2505	Chile: O'Higgins (R-VI), Maule (R-VII), Bío Bío (R-VIII), Araucanía (R-IX), Región Metropolitana (RM)
S. ruzi Compagnucci, 2015	927	Argentina: Neuquén, Mendoza
S. tadeyi Compagnucci, 2015	30–310	Argentina: Chubut, Neuquén, Santa Cruz

TABLE 4

Floral records for species of *Spinoliella* Ashmead and *Xeranthrena* Gonzalez and Engel, new genus

Records are summarized following the style employed recently by Engel et al. (2017), and cover those newly recorded herein as well as from the literature (see individual species accounts in text). All floral species are eudicots (tricolpates) of the Pentapetalae (Eudicots: Core Eudicots: Pentapetalae), and divided among the "superrosids" (represented here solely by rosids) and "superasterids" (Soltis et al., 2005; Moore et al., 2010). It must be noted that these records do not distinguish between bees collecting pollen versus nectar, and so may not represent pollen host associations. Floral names were checked against the Plant List (2013).

CLADE ROSIDS	
Order Malvales	
Family Malvaceae	
Andeimalva chilensis (Gay) J.A. Tate	*S. propinqua*
Cristaria gracilis Gay	*S. longirostris*
Cristaria sp.	*S. herbsti*, *S. maculata*, *S. rozeni*
Lecanophora heterophylla (Cav.) Krapov.	*S. incudinotata*
Tarasa antofagastana (Phil.) Krapov.	*S. incudinotata*
Unidentified gen., sp.	*S. rozeni*
Order Oxalidales	
Family Oxalidaceae	
Oxalis sp.	*S. psamita*
SUPERASTERIDS	
Order Caryophyllales	
Family Cactaceae	
Unidentified gen., sp.	*S. nomadoides*, *S. rufiventris*
Family Portulacaceae	
Cistanthe salsoloides (Barnéoud) Carolin ex M.A. Hershkovitz	*S. longirostris*
CLADE ASTERIDS	
Order Boraginales	
Family Boraginaceae	
Heliotropium sp.	*S. obscura*
Order Ericales	
Family Primulaceae	
Primula sp.	*S. propinqua*, *S. rufiventris*
Order Solanales	
Family Solanaceae	
Alona rostrata Lindl.[1]	*S. psamita*
Cacabus flavus I.M. Johnst.	*S. packeri*, *S. psamita*
Exodeconus prostratus (L'Hér.) Raf.	*X. imponticula*
E. maritimus (Benth.) D'Arcy	*X. imponticula*
Nolana paradoxa Lindl.[1]	*S. longirostris*, *S. psamita*
Nolana sp.[1]	*S. rozeni*
Sclerophylax arnottii Miers[2]	*S. aidae*

[1] Typically listed under Nolanaceae, this family is now considered to be a synonym of Solancaeae (APG, 2009; Reveal and Chase, 2011).

[2] Recorded on labels as *Sclerophylax gilliesii* Miers (see account of *S. aidae* in text), the species is today considered a synonym of *S. arnottii* Miers.

–Outer metatibial spur distinctly curved apically, somewhat stout, and with coarser branches than those of inner spur; mesoscutum and mesoscutellum with fine and contiguous alveolate punctures among large, sparse setiferous punctures (Chile).....3

3(2) Large bees (body length 7–8 mm); mesobasitarsus 3.3× longer than broad; metasoma light reddish brown contrasting with dark reddish brown to black head and mesosoma; terga with yellow maculation reduced to lateral spots (Chile)....*S. nomadoides* (Spinola)

–Small bees (body length 4–6 mm); mesobasitarsus at most 3.0× longer than broad; metasoma yellowish or dark brown, as on head and mesosoma; terga often with extensive yellow maculation, sometimes forming bands.....4

4(3) Mesoscutum and mesoscutellum finely and contiguously punctate-alveolate among large, sparse setiferous punctures, alveoli deep, distinct, particularly on mesoscutellum; head width 1.6–1.8 mm (Chile: Tarapacá (R-I), Antofagasta (R-II), Arica and Parinacota (R-XV); 1935–3255 m)..... .....*S. packeri* Gonzalez and Engel, n. sp.

–Mesoscutum and mesoscutellum finely alveolate among large, sparse setiferous punctures, alveoli often faint thus integument appearing imbricate, shiny, particularly on disc of mesoscutellum; head width 1.4–1.6 mm (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV); 16–2771 m).....5

5(4) Clypeus projecting below inferior tangent of compound eyes by more than half its length; without maculation on face; facial fovea linear, about same width across its length; clypeus, paraclypeal swelling, lower paraocular area, and scape with diffuse to nearly absent yellow maculation (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III))..... .....*S. longirostris* Toro

–Clypeus projecting below inferior tangent of compound eyes by about half its length; facial fovea wider ventrally, slitlike dorsally; clypeus, paraclypeal swelling, lower paraocular area, and scape often with distinct yellow maculation (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV))).....*S. psamita* Toro and Ruz

6(1) Disc of mesoscutum largely smooth and shiny between sparse punctures (≥1.0× a puncture width) (in *S. polita* mesoscutum is faintly imbricate to nearly smooth whereas mesoscutellum is smooth and shiny).....7

–Disc of mesoscutum dull to weakly shiny, with contiguous, minute punctures or alveoli (sometimes appearing strongly imbricate at lower magnifications) among larger, sparser, and coarser setiferous punctures.....10

7(6) Small bees (body length 4–5 mm); frons largely impunctate with scattered minute punctures (Argentina).....*S. aidae* Gonzalez, Smith-Pardo, and Engel, n. sp.

–Larger bees (body length 7–8 mm); frons punctate throughout (Chile).....8

8(7) Metasoma orange, distinctly contrasting with dark reddish brown to black head and mesosoma; terga with maculation reduced to lateral spots; clypeus basally with epistomal sulcus convex; mesobasitarsus about 3.0× longer than broad (Chile: Maule (R-VII))..*S. polita* Gonzalez and Engel, n. sp.

–Metasoma dark brown, as on head and mesosoma, sometimes light brown; terga often with extensive yellow or cream maculation, sometimes forming bands; clypeus basally with epistomal sulcus straight; mesobasitarsus at least 3.6× longer than broad.....9

9(8) Pygidial plate broad, with lateral margins converging toward apex at a 60° angle; metabasitibial plate not delimited by a distinct border or carina; facial fovea shallow (Chile: Coquimbo (R-IV), Valparaíso (R-V)) .....*S. herbsti* (Friese)

–Pygidial plate narrow, with lateral margins converging toward apex at a 40° angle; metabasitibial plate delimited by a strong border or carina; facial fovea deep, forming a distinct groove (Chile: Atacama (R-III), Coquimbo (R-IV)).....*S. confusa* Gonzalez and Engel, n. sp.

10(6) Metanotum without maculation.....11

–Metanotum with maculation.....15

11(10)Metasoma dark reddish brown to black, as on head and mesosoma; terga often with extensive yellow or cream maculation, sometimes forming continuous bands.....12

–Metasoma largely orange to light reddish brown, contrasting with dark reddish brown to black head and mesosoma; terga with maculation often reduced to lateral spots (Chile: O'Higgins (R-VI), Maule (R-VII), Bío Bío (R-VIII), Araucanía (R-IX), Región Metropolitana (RM))..... .....*S. rufiventris* Toro and Ruz (in part)

12(11)Facial fovea shallow, not forming a distinct groove; pygidial plate with lateral margins slightly convex (T3 and T4 often with broadly interrupted bands medially, gap between bands at least one-half transverse width of lateral band) (Chile: Atacama (R-III), Coquimbo (R-IV))..... .....*S. opaca* Rodríguez, Toro, and Ruz

–Facial fovea deep, forming a distinct groove; pygidal plate with lateral margins straight or nearly so (T3 and T4 often with continuous or medially broken yellow or cream bands, gap between bands often narrower than abo ve).....13

13(12)Metasomal T1–T4 with depressed apical margins semi-translucent; pygidial plate narrow, with lateral margins converging toward apex at a 40° angle; clypeus with distal margin straight, disc basally imbricate between punctures; distal margin of mesoscutellum with thin yellow band; T3 and T4 with continuous or medially broken yellow or cream bands, gap between bands at most one-fourth transverse width of lateral band (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV))..... .....*S. rozeni* Toro and Ruz (in part)

–Metasomal T1–T4 with depressed apical margins opaque, brown; pygidial plate broader, with lateral margins converging toward apex at a 50–60° angle; clypeus medially projected on distal margin, its disc basally smooth and shiny between punctures; distal margin of mesoscutellum often without thin yellow band; T3 and T4 with broadly interrupted bands medially, gap between bands at least one-half transverse width of lateral band.....14

14(13)Discs of mesoscutum and mesoscutellum shiny, with micropunctures shallow and often faint, thus integument appearing imbricate; pygidial plate narrow, with lateral margins converging toward apex at a 50° angle; clypeus yellow laterally and on distal margin; pronotum yellow dorsally (Chile: Maule (R-VII))..... .....*S. propinqua* Gonzalez and Engel, n. sp.

–Discs of mesoscutum and mesoscutellum dull, with micropuntures deep, coarse throughout; pygidial plate broad, with lateral margins converging toward apex at a 60° angle; clypeus yellow laterally, rarely on distal margin; pronotum black (Chile: Coquimbo (R-IV), Valparaíso (R-V), Maule (R-VII), Región Metropolitana (RM))..... .....*S. maculata* (Spinola)

15(10)Disc of mesoscutum strongly imbricate-reticulate among large, coarse, setiferous punctures separated by 1–2× a puncture width; metabasitibial plate weakly depressed on disc, not delimited by border or carina (Argentina)....*S. incudinotata* Compagnucci

–Disc of mesoscutum with contiguous, minute punctures or alveoli among large, coarse, setiferous punctures of variable density; metabasitibial plate distinctively depressed on disc, delimited posteriorly either by a weak or strong border (Argentina, Chile).....16

16(15)Small bees (body length ~4.0 mm); forewing with membrane whitish, pterostigma and veins light yellow; terga predominantly yellowish, with dark brown bands on discs of T2–T4 (Argentina)..... .....*S. tadeyi* Compagnucci

–Larger bees (body length 6–8.0 mm); forewing with membrane, pterostigma, and veins brownish or yellowish; terga with variable color and maculation, dark brown, yellowish or light reddish brown with complete bands or lateral spots on terga.....17

17(16)Metasoma dark reddish brown, as with head and mesosoma; T1–T5 with continuous or medially broken yellow or cream bands, gap between bands at most one-fourth transverse width of lateral band; clypeus basally with integument imbricate among shallow, small, sparse (1–2× a puncture width) punctures (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV))..... .....*S. rozeni* Toro and Ruz (in part)

–Metasoma largely orange to light reddish brown, contrasting with dark reddish brown to black head and mesosoma; T3–T5 with widely separated yellow or cream bands, gap between maculation at least as wide as transverse width of lateral band; clypeus basally with integument smooth and shiny among coarse, large, contiguous punctures.....18

18(17)Pygidial plate broad, with lateral margins converging toward apex at a 50° angle (Chile)..... .....*S. rufiventris* Toro and Ruz (in part)

–Pygidial plate narrower, with lateral margins converging toward apex at a 30–35° angle (Argentina).....*S. ruzi* Compagnucci

Males

Note: The male of *S. polita* is unknown. We were not able to examine the male of *S. obscura* but based on the characters indicated in the original description (Compagnucci, 2015), it will run to *S. aidae*.

1.Outer surface of metabasitarsus covered by short (at most as long as maximum width of metabasitarsus), appressed to semierect setae (fig. 12F); facial fovea narrow, slitlike, often difficult to see, at most as wide as 1/5 width of antennal scape.....2

–Outer surface of metabasitarsus covered by distinctly long (at least twice as long as maximum width of metabasitarsus), semierect setae (fig. 18F); facial fovea of variable width and shape, often broader, distinct, at least 1/3 width of antennal scape.....5

2(1)Middle-sized bees (body length 7–8 mm); clypeus about 5× broader than long; mandible arcuate; metasoma light reddish brown, contrasting with dark reddish brown to black head and mesosoma; terga with yellow maculations reduced to lateral spots (Chile).....*S. nomadoides* (Spinola)

–Small bees (body length 5–6 mm); clypeus about 3× or less broader than long; mandible straight or nearly so; metasoma dark brown, as on head and mesosoma; terga with variable maculation, reduced or with extensive maculations laterally, sometimes forming bands.....3

3(2)Clypeus, in facial view, distinctly projected ventrally, beginning at about inferior tangent of compound eyes; glossa long, surpassing posterior margin of procoxae in repose (Chile).....*S. longirostris* Toro

–Clypeus, in facial view, not distinctly projected ventrally, apex surpassing inferior tangent of compound eyes at most by one-half of its length; glossa short, not reaching procoxae in repose.....4

4(3)Mesoscutum and mesoscutellum finely punctate-alveolate among large, sparse setiferous punctures, alveoli deep, distinct, particularly on mesoscutellum; discs of T1–T4 dark brown without distinct yellow or cream maculation (sometimes with small, diffuse maculation laterally on T2 and T3), depressed apical margins yellowish to light reddish brown; head width 1.7–1.9 mm (Chile: Tarapacá (R-I), Antofagasta (R-II), Arica and Parinacota (R-XV); 1935–3255 m)..... .....*S. packeri* Gonzalez and Engel, n. sp.

–Mesoscutum and mesoscutellum finely alveolate among large, sparse setiferous punctures, alveoli often faint thus integument appearing imbricate, shiny, particularly on disc of mesoscutellum; discs of T1–T4 dark brown with large lateral maculations, depressed apical margins of at least basal three terga light reddish brown; head width 1.4–1.6 mm (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama

(R-III), Coquimbo (R-IV); 16–2358 m).....
.....*S. psamita* Toro and Ruz

5(1)Disc of mesoscutum largely smooth and shiny between sparse punctures (≥1.0× a puncture width).....6

–Disc of mesoscutum dull to weakly shiny, strongly or weakly imbricate between punctures, *or* with minute, contiguous punctures.....7

6(5)Small bees (body length 4–5 mm); frons with large impunctate areas, punctures separated by at least 2× a puncture width; tibiae and tarsi largely yellow (Argentina).....
.....*S. aidae* Gonzalez, Smith-Pardo, and Engel, n. sp.

–Larger bees (body length 6–7 mm); frons densely punctate, punctures separated by at most a puncture width; tibiae and tarsi dark reddish brown, often with reduced yellow spots basally (Chile).....*S. herbsti* (Friese)

7(5).Metanotum without maculation.....8

–Metanotum with maculation.....13

8(7)Metasoma dark reddish brown to black, as on head and mesosoma.....9

–Metasoma largely orange to light reddish brown, contrasting with dark reddish brown to black head and mesosoma (Chile: O'Higgins (R-VI), Maule (R-VII), Bío Bío (R-VIII), Araucanía (R-IX), Región Metropolitana (RM)).....
.....*S. rufiventris* Toro and Ruz (in part)

9(8)Disc of mesoscutum weakly shiny, strongly or weakly imbricate among sparse setiferous punctures; T1–T5 with continuous or medially broken yellow or cream bands, gap between maculation at most as wide as transverse width of lateral band (Chile).....
S. confusa Gonzalez and Engel, n. sp. (in part)

–Disc of mesoscutum dull, with minute, contiguous punctures among sparse setiferous punctures; T1–T5 with widely separated bands, gap between maculation at least as wide as transverse width of lateral band...10

10(9)Metasomal T1–T5 with depressed apical margins semitranslucent.....11

–Metasomal T1–T5 with depressed apical margins opaque, brown.....12

11(10)Facial fovea shaped as an inverted teardrop, widest dorsally; clypeus basally smooth and shiny to faintly imbricate, yellow maculation often restricted to apical one-third; scape and pedicel black; labrum coarsely punctate on distal half; pronotal lobe and mesoscutellum without maculation, black (Chile: Atacama (R-III), Coquimbo (R-IV)).....
.....*S. opaca* Rodríguez, Toro, and Ruz

–Facial fovea not an inverted teardrop, about same width throughout its length; clypeus basally strongly imbricate, yellow maculation often more extensive, reaching basal half; scape and pedicel yellow, at least distally; labrum finely punctate on distal half; mesoscutellum distally with thin yellow maculation, sometimes faint and only visible laterally; pronotal lobe often yellow or with diffuse yellow spot (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV)).....
.....*S. rozeni* Toro and Ruz (in part)

12(10)Metasomal T5 and T6 with depressed apical margins covered by decumbent setae except at most on apical third (Chile: Coquimbo (R-IV), Valparaíso (R-V), Maule (R-VII), Región Metropolitana (RM)).....
.....*S. maculata* (Spinola)

–Metasomal T5 and T6 with depressed apical margins largely asetose, decumbent setae present at most on basal half (Chile: Maule (R-VII)).....
.....*S. propinqua* Gonzalez and Engel, n. sp.

13(7)Metasoma dark reddish brown [some darker specimens of *S. incudinotata* from Argentina will run here].....14

–Metasoma largely orange to light reddish brown, contrasting with dark reddish brown to black head and mesosoma.....16

14(13)Forewing with membrane whitish, pterostigma and veins light yellow; minute bees (head width ~1.5 mm) (Argentina) .....
.....*S. tadeyi* Compagnucci

–Forewing with membrane hyaline or brownish, pterostigma and veins dark brown; small to large bees (head width >2 mm) (Chile)....15

15(14)Smaller bees (body length 6–7 mm); head width 2.0–2.1 mm; clypeus 3.2× broader than long, basally imbricate between punctures; facial fovea shallow; T1–T5 with widely separated yellow or cream bands, gap between maculation at least as wide as transverse width of lateral band; metabasitibial plate flat on disc, not delimited by a distinct border or carina (Chile: Tarapacá (R-I), Antofagasta (R-II), Atacama (R-III), Coquimbo (R-IV))..... *S. rozeni* Toro and Ruz (in part)

–Larger bees (body length 7–8 mm); head width 2.2–2.6 mm; clypeus nearly 4.0× broader than long, basally smooth and shiny between punctures; facial fovea deep, forming a groove; T1–T5 with continuous or medially broken yellow or cream bands, gap between maculation at most as wide as transverse width of lateral band; metabasitibial plate depressed on disc, delimited by a border or carina (Chile: Atacama (R-III), Coquimbo (R-IV))..... *S. confusa* Gonzalez and Engel, n. sp. (in part)

16(13)Mesoscutum, mesoscutellum, and dorsal surface of propodeum strongly imbricate; T2–T5 with depressed marginal zones densely covered by long, appressed, minutely branched white setae laterally (appearing as poorly developed fasciae); forewing with membrane hyaline, pterostigma and veins light yellow (Argentina)..... .....*S. incudinotata* Compagnucci

–Mesoscutum, mesoscutellum, and dorsal surface of propodeum densely punctate, punctures contiguous; T2–T5 with depressed marginal zones with minute, appressed, simple, light ferruginous setae throughout; forewing with membrane yellowish, pterostigma and veins brownish (Argentina and Chile).....17

17(16)Median process of S8 robust, about 4× longer than broad (Chile)..... .....*S. rufiventris* Toro and Ruz (in part)

–Median process of S8 slender, about 7× longer than broad (Argentina)..... .....*S. ruzi* Compagnucci

Spinoliella aidae Gonzalez, Smith-Pardo, and Engel, new species

Figures 4, 5

Diagnosis: This Argentinean species can be recognized by the following combination of features: small body size (4–5 mm); female pygidial plate with apex bifid (fig. 4G); female mesobasitarsus robust, 2.7× longer than broad; metabasitibial plate depressed, asetose on disc, delimited by strong carina, apically broadly rounded (fig. 4C) (delimited by weaker borders in the male: fig. 5D); T1–T5 with yellow bands on discs (figs. 4D, 4F, 5B), medially interrupted in the female and sometimes reduced to lateral spots in the male; and the frons, mesoscutum, mesoscutellum, and propodeum smooth and shiny, largely impunctate (e.g., fig. 4E). This species resembles *S. psamita* and *S. tadeyi* in the small body size and color, but in those species the integument of the head and mesosoma is duller, with minute, contiguous punctures. *Spinoliella psamita* also differs from *S. aidae* in the pygidial plate, which is apically truncate and not bifid in the former (fig. 19E), and the outer metatibial spur, which is distinctly curved apically (straight in *S. aidae*).

Description: **Female.** Total body length 4.7 mm; forewing length 2.9 mm; head width 1.3 mm. Head 1.2× wider than long; inner orbits of compound eyes subparallel or nearly so (fig. 4A); intertorular distance 2.2× OD, about 1.4× greater than torulorbital distance; torulus diameter slightly narrower than OD; ocellocular distance 1.5× OD, 0.8× length of ocelloccipital distance; interocellar distance 2.4× OD, 1.6× greater than ocellocular distance; compound eye about twice as long as wide; clypeus 2.6× broader than long, with apex surpassing inferior tangent of compound eyes by about one-half its length, projected about 0.7× compound eye width in lateral view; gena 0.7× width of compound eye in profile, widest medially; inner subantennal sulcus

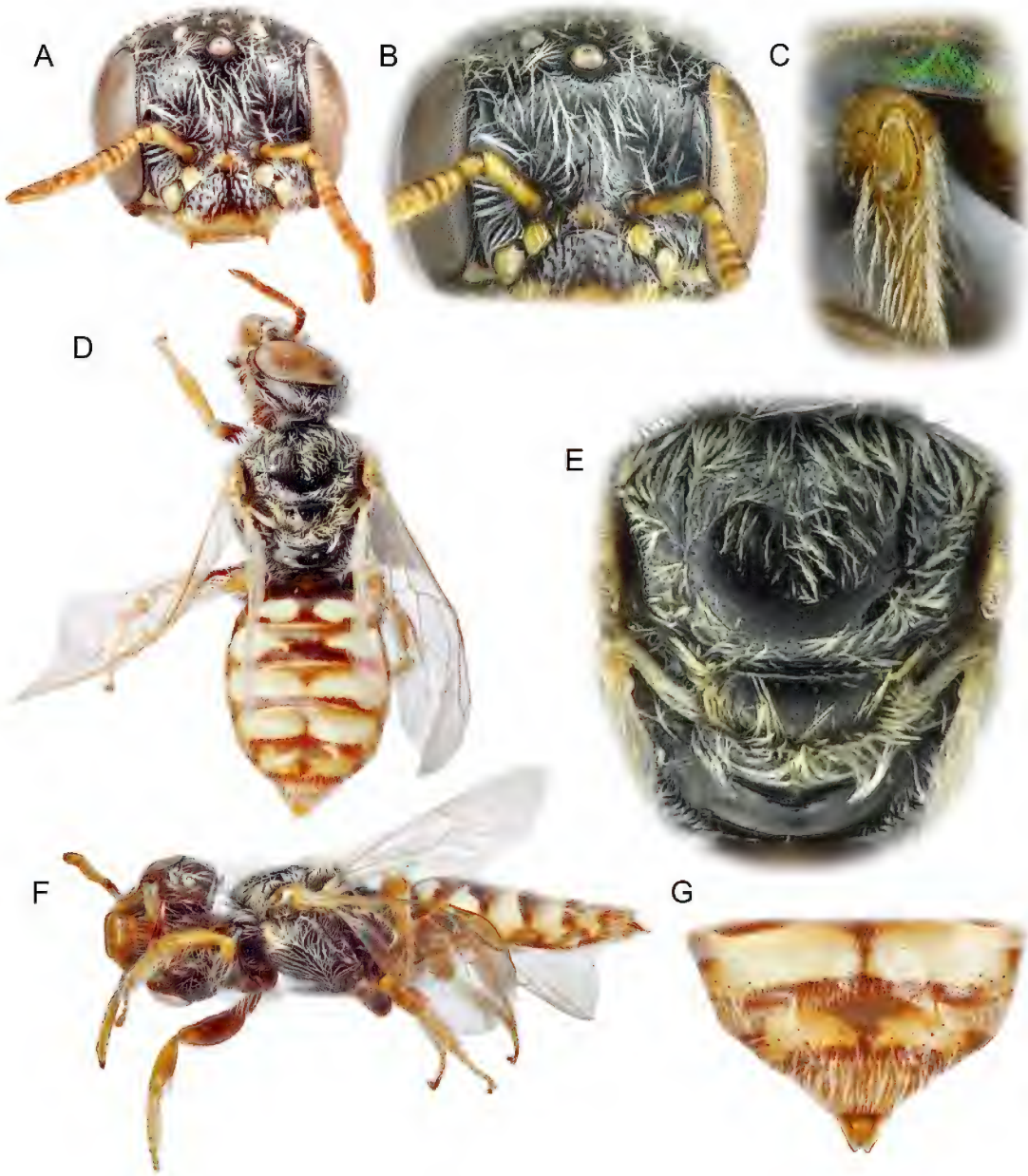

FIGURE 4. Female holotype of *Spinoliella aidae* Gonzalez, Smith-Pardo, and Engel, new species. **A.** Facial view. **B.** Detail of face. **C.** Metabasitibial plate. **D.** Dorsal habitus. **E.** Detail of mesoscutum, mesoscutellum, metanotum, and propodeum in dorsal view. **F.** Lateral habitus. **G.** Terminal metasomal terga.

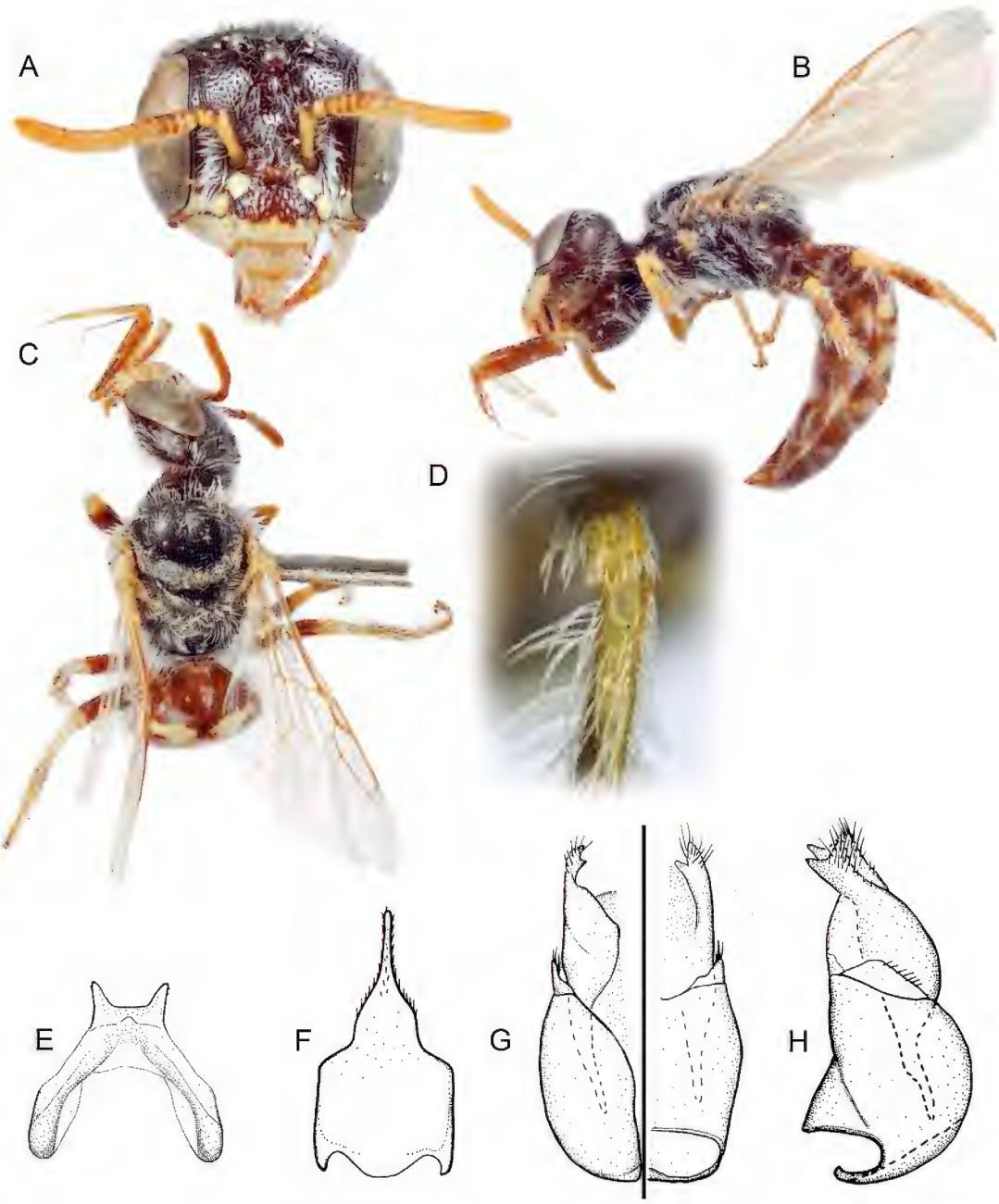

FIGURE 5. Male paratype of *Spinoliella aidae* Gonzalez, Smith-Pardo, and Engel, new species. **A.** Facial view. **B.** Lateral habitus. **C.** Dorsal habitus. **D.** Metabasitibial plate. **E.** Metasomal S7. **F.** Metasomal S8. **G.** Genital capsule in dorsal (left half) and ventral (right half) views. **H.** Lateral aspect of genital capsule.

about one-half length of outer subantennal sulcus; facial fovea deep, widest inferiorly (0.6× width of scape), about 6.0× longer than broad, 1.7× longer than scape; scape 3.2× longer than broad; pedicel 1.6× longer than F1, about as long as wide; F1 broader than long, about as long as F2 and F3 individually; remaining flagellomeres broader than long, except last flagellomere longer than broad. Right protibial spur with apical portion of rachis about one-third length of malus, with two elongate branches (not including apical portion of rachis), left protibial spur with apical portion of rachis about one-half length of malus, with distinct row of four elongate branches; mesobasitarsus robust, about 2.7× longer than broad; mesotibial spur straight, slightly longer than one-half mesobasitarsus length; metatibial spurs straight, inner spur about 1.6× longer than the outer spur; metatibia 4.3× longer than broad; metabasitibial plate depressed, asetose on disc, delimited by strong carina, broadly rounded apically (fig. 4C); metabasitarsus 6.7× longer than broad, about 0.6× length of metatibia. Pygidial plate with lateral margins converging toward apex at 50° angle, apically bifid (fig. 4G).

Color black, except reddish brown on apex of mandible, lower gena, pronotum, coxae, trochanters, femora excluding apices, and metasoma (fig. 4A, B, D, E). Yellow to cream maculation as follows (fig. 4A, D, E): mandible basally; labrum; distal half of clypeus; lower paraocular area including paraclypeal swelling; subantennal area; supraclypeal area; antenna except on posterior surfaces of scape and pedicel; pronotal lobe; apices of femora and remaining podites of legs, except pro- and mesotibia with diffuse dark brown spot on inner surfaces, metatibia with large dark brown spot on inner and outer surfaces distally, and apices of pretarsal claws; T1–T5 with broad, nearly complete bands on discs, widely separated on basal two terga. Tegula translucent yellow; wing membranes hyaline with weak green and copper highlights, veins and pterostigma light brown.

Body pubescence pale to whitish, sparse, minutely branched, except ventral margin of mandible, labrum, tarsi of all legs, and outer surface of metatibia with poorly branched or simple, stiff setae; setae longer (at least 2.0× OD) on ventral margin of mandible, hypostomal area, mesoscutellum, protrochanter, profemur, posterior margin of metabasitarsus, T5 and T6. Metasomal terga and sterna with minute, appressed, sparse setae, denser and longer laterally.

Outer surface of mandible distally and basal area of labrum smooth and shiny, impunctate; clypeus with sparse, faint punctures separated by a puncture width or more, integument between punctures smooth and shiny as on remaining areas of face; supraclypeal area laterally with scattered, large, faint punctures as on clypeus; subantennal area with scattered, minute punctures near torulus; paraclypeal swelling impunctate; remaining areas of face with smaller, coarser punctures than on clypeus separated by at least 2× a puncture width, punctures becoming minute, scattered toward median ocellus; ocellocular area impunctate near lateral ocellus, shiny, weakly imbricate; vertex with coarse punctures separated by at least a puncture width; gena smooth and shiny with minute, scattered punctures; hypostomal area weakly imbricate with coarser, denser punctures than on gena laterally. Mesosoma generally smooth and shiny (e.g., fig. 4E), except weakly to strongly imbricate on pronotum laterally, tegula, mesepisternum dorsally and ventrally, and metepisternum, lateral and posterior surfaces of propodeum and legs; punctures minute and scattered on anterolateral area of mesoscutum, mesepisternum ventrally, posterior surface of propodeum, and most of legs with coarser, denser punctures. Metasomal terga and sterna imbricate with minute, scattered punctures on discs, coarser and denser on terminal terga.

Male. As in female except pubescence slightly longer and denser, terga with integumental bands broadly separated medially, and the following: total body length 4.5–4.8 mm; forewing length 2.8–2.9 mm; head width 1.3–1.4 mm. Ocellocular distance slightly narrower than ocelloccipital distance; compound eye 1.8× longer than wide; mandible with large, triangular basal tooth on

upper margin; facial fovea about same width across length (0.3× width of scape), 3.0× longer than broad, about as long as scape; scape 2.6× longer than broad. Protibial spur with apical portion of rachis about two-thirds length of malus, with six or seven elongate branches (not including apical portion of rachis); mesotibial spur 0.7× mesobasitarsus length; mesobasitarsus about 3.5× longer than broad; metatibia about 4.0× longer than broad; metabasitibial plate with borders not as well defined as in female (fig. 5D); metabasitarsus 4.5× longer than broad. S7, S8 and genital capsule as in figure 5E–H.

Holotype: ♀, Arg [Argentina], La Rioja Dept. Grl. La Madrid [General Lamadrid], 2 km N, Villa Castelli 13-15 Oct 97 malaise, net & pantrap, Irwin F, Parker, S Roig, 28.9977°S, 68.2027°W (BBSL).

Paratypes (n = 1♀, 7♂♂): Argentina: **Catamarca:** 1♀, 1♂, San Fernando, March 7, 1990, Rozen & Roig, on *Sclerophylax gilliesii* // SEMC 1008510, 1008509 (SEMC); 6♂♂ with same data as other paratypes, except one without floral record (5♂♂ AMNH, 1♂ SEMC).

Etymology: This species is named after Aida Pardo, beloved mother of Allan H. Smith-Pardo.

Distribution: Argentina: Catamarca, La Rioja.

Floral record: *Sclerophylax arnottii* Miers (recorded on labels as *S. gilliesii* Miers, which is today a junior synonym) (Solanaceae).

Spinoliella confusa Gonzalez and Engel, new species

Figures 6, 7

Diagnosis: *Spinoliella confusa* can be recognized by the following combination of traits: large body size (6–8 mm); female pygidial plate narrow, with lateral margins converging toward apex at a 40° angle, apically bifid (fig. 6F); discs of mesoscutum and mesoscutellum nearly smooth and shiny among punctures in the female (fig. 6B), minutely, shallowly punctate in the male (fig. 7D), with coarse, scattered setiferous punctures separated by at least a puncture width; female mesobasitarsus slender, 3.6× longer than broad; and metabasitibial plate delimited by a strong border or carina (fig. 6C) (not well defined in the male: fig. 7E). The female is most similar to that of *S. herbsti* in the large body size, pygidial plate with apex bifid, dark brown to black body color, and sculpturing of the mesoscutum. However, in *S. herbsti* the pygidial plate is much broader, with lateral margins converging toward apex at a 60° angle (fig. 8F) and the metabasitibial plate is not delimited by a strong carina or border. The male of *S. confusa* resembles to some degree that of *S. maculata*, mainly in the body size and sculpturing of the mesoscutum and mesoscutellum; however, in *S. maculata* these areas are rather dull, with micropunctures distinctly deep throughout, whereas in *S. confusa* they are shinier, with micropunctures shallow, particularly on the disc of mesoscutellum (fig. 7D).

Description: **Female.** Total body length 8.3 mm (8.3–9.1 mm); forewing length 5.4 mm (5.4–5.8 mm); head width 2.4 mm (2.3–2.5 mm). Head 1.3× wider than long; inner orbits of compound eyes slightly diverging ventrally (fig. 6A); intertorular distance 2.8× OD, about 1.4× greater than torulorbital distance; torulus diameter about equal to OD; ocellocular distance 2.3× OD, about as long as ocelloccipital distance; interocellar distance 2.2× OD, about as long as ocellocular distance; compound eye about twice as long as wide; mandible with large, triangular basal tooth or process on upper margin; clypeus 3.1× broader than long, with apex surpassing inferior tangent of compound eyes by about one-half its length, projected about 0.5× compound eye width in lateral view; gena 0.7× width of compound eye in profile, widest medially; inner subantennal sulcus about one-half length of outer subantennal sulcus; facial fovea deep, widest inferiorly (0.9× width of scape), about 5.4× longer than broad, 1.7× longer than scape; scape 2.8× longer than broad; pedicel about as long as F1, 1.2× broader than long; F1 slightly longer

FIGURE 6. Female holotype of *Spinoliella confusa* Gonzalez and Engel, new species. **A.** Facial view. **B.** Detail of mesoscutum, mesoscutellum, and metanotum in dorsal view. **C.** Metabasitibial plate. **D.** Dorsal habitus. **E.** Lateral habitus. **F.** Pygidial plate.

than broad, about as long as F2, 1.2× longer than F3; remaining flagellomeres broader than long, except last flagellomere longer than broad. Protibial spur with apical portion of rachis about two-thirds length of malus, with distinct row of seven elongate branches (not including apical portion of rachis); mesotibial spur straight, about one-half mesobasitarsus length; mesobasitarsus slender, about 3.6× longer than broad; metatibial spurs straight, inner spur about 1.4× longer than the outer spur; metabasitibial plate slightly depressed, asetose on disc, delimited by strong border, narrowly rounded (fig. 6F); metatibia 4.3× longer than broad; metabasitarsus 8.0× longer than broad, about 0.7× length of metatibia. Pygidial plate with lateral margins converging toward apex at 40° angle, apex bifid (fig. 6F).

Color mainly dark reddish brown except black on face, mesoscutum, mesoscutellum, propodeal triangle, mesepisternum, and lateral fovea of T2 (head and mesosoma, excluding legs, largely black in one paratype) (fig. 6A, B), and cream to yellowish maculations as follows (fig. 6A–E): mandible except apically; labrum; clyp-

eus except basally and distal margin submedially; supraclypeal area; lower paraocular area including paraclypeal swelling; subantennal area; outer surfaces of scape, pedicel, F1, and F2 with small apical spot; inner surface of flagellum, darkened apically; dorsal surface of pronotum with small lateral spot; pronotal lobe; anterior half of tegula; humeral sclerite; veins near wing bases; mesoscutellum with thin band on distal margin; metanotum; apices of femora; outer surfaces of tibiae and basitarsi, except anteromedially on meso- and metatibiae; discs of T1, T4, and T5 each with complete band medially emarginate on anterior margin, T2 and T3 each with medially interrupted band, broadly separated on T2 (T1 with medially interrupted band in one paratype). Tegula translucent yellow; wing membranes subhyaline, slightly yellowish, with weak green and copper highlights, veins light brown, darker on Sc+R, prestigma, and pterostigma.

Body pubescence yellowish to light reddish brown, sparse, minutely branched, except ventral margin of mandible, labrum, mesepisternum ventrally, tarsi of all legs, and outer surface of metatibia with simple, stiff setae; setae longer (at least 2× OD) on ventral margin of mandible, hypostomal area, mesoscutellum, protrochanter, profemur, posterior margin of metabasitarsus, T5 and T6. Metasomal terga and sterna with minute, appressed, sparse setae, denser and longer laterally, particularly on T2–T4; anterior-facing surface of T1 with sparse, minutely branched, erect setae (OD).

Outer surface of mandible distally and basal area of labrum smooth and shiny, impunctate; clypeus smooth and shiny, with faint punctures separated by a puncture width or more, punctures absent midapically, denser laterally; paraclypeal swelling and subantennal area impunctate; supraclypeal area smooth and shiny, laterally with scattered, small punctures as on lower paraocular area; paraocular area, lateral to torulus, and lower half of frons smooth and shiny, with coarse setiferous punctures as on supraclypeal area, separated by a puncture width or less; remaining areas of face, including vertex, minutely punctate with smaller, sparser setiferous punctures than on lower half of frons; paraocular area, lateral to facial fovea, smooth and shiny to weakly impunctate, with coarse, small punctures; gena smooth and shiny, with small, faint punctures separated by at least two puncture widths, punctures coarser, denser on hypostomal area. Mesosoma, including legs, generally smooth and shiny between punctures, except: propodeal triangle alveolate, somewhat imbricate distally; disc of mesoscutum, metepisternum, sides of propodeum, tegula, and legs weakly imbricate; ventral surface of mesepisternum strongly imbricate. Pronotum with scattered, minute punctures; mesoscutum with large, scattered punctures separated by at least a puncture width on disc (fig. 6B); disc of mesoscutellum with sparser punctures than mesoscutum; mesepisternum laterally with scattered, larger, shallower punctures than on disc of mesoscutum, ventrally with denser, smaller punctures. Metasomal terga and sterna weakly imbricate with minute, scattered punctures, coarser and denser on sterna and terminal terga.

Male. As in female except longer, denser pubescence (cf. figs. 6A and 7A), terga with integumental bands often broadly separated medially, and the following: total body length 8.2–10 mm; forewing length 5.0–5.8 mm; head width 2.2–2.6 mm. Head 1.5× wider than long; intertorular distance 2.7× OD, about 1.5× greater than torulorbital distance; torulus diameter 0.8× OD; ocellocular distance about twice as long as OD, about 0.8× ocelloccipital distance; interocellar distance slightly longer than ocellocular distance; clypeus 4.0× broader than long; facial fovea about 4.0× longer than broad, widest medially (0.5× width of scape), 0.8× length of scape; scape 2.5× longer than broad; pedicel slightly shorter (0.8×) than F1, 1.3× broader than long; F1 1.2× longer than broad, 1.2× longer than F2, about as long as F3. Protibial spur with apical portion of rachis with distinct row of 11 elongate branches; inner metatibial spur about 1.3× lon-

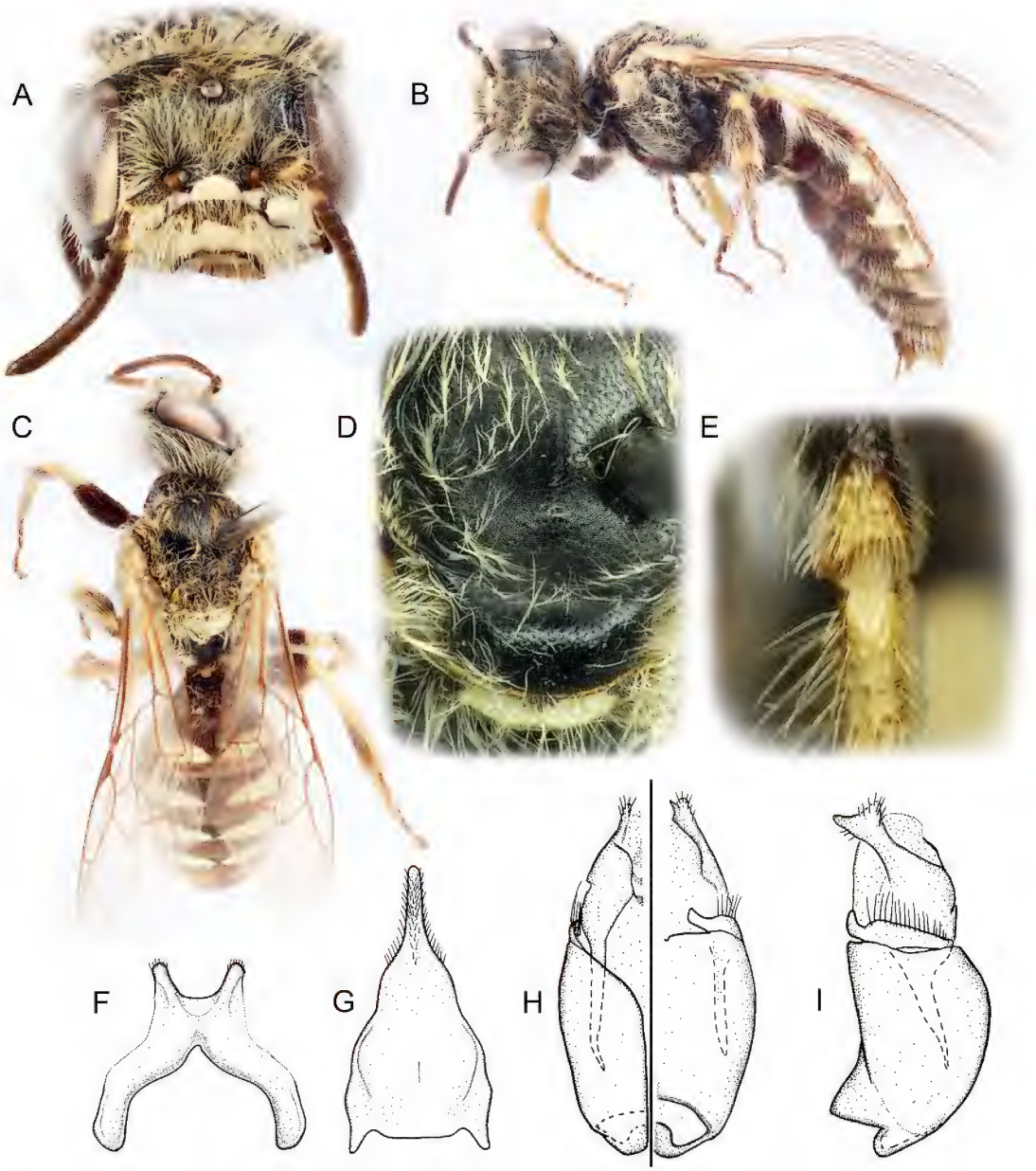

FIGURE 7. Male paratype of *Spinoliella confusa* Gonzalez and Engel, new species from Elqui Province, Pangue, Chile (PCYU). **A.** Facial view. **B.** Lateral habitus. **C.** Dorsal habitus. **D.** Detail of mesoscutum, mesoscutellum, and metanotum in dorsal view. **E.** Metabasitibial plate. **F.** Metasomal S7. **G.** Metasomal S8. **H.** Genital capsule in dorsal (left half) and ventral (right half) views. **I.** Lateral aspect of genital capsule.

ger than the outer spur; metabasitibial plate delimited by border not as strong as in female (fig. 7E); metabasitarsus 5.0× longer than broad, about 0.5× length of metatibia. Metasomal S7, S8, and genital capsule as in figure 7F–I.

Meso- and metabasitarsi dark reddish brown; T1–T5 each with band broadly interrupted medially (narrowly interrupted in one paratype).

Paraocular area, below facial foveal, impunctate, nearly smooth and shiny (weakly imbricate in one paratype). Pronotum with dense, small punctures midposteriorly on dorsal surface; mesoscutum and mesoscutellum with two types of punctures (fig. 7D): minute, nearly contiguous, shallow punctures, becoming faint to nearly absent on discs, and larger, deeper, sparser, setiferous punctures separated by one to two puncture widths. Metabasitibial plate with minute punctures on disc.

Holotype: ♀, Chile: Huasco Prov., 5 km N Incahausi, rd. to Mina Los Cristales, 990 m, pan-trap M Irwin/D Yeates, 29.1899°S, 71.0204°W // SEMC 1008467 (SEMC).

Paratypes (n = 4♀♀, 5♂♂): Chile: **Atacama (R-III):** 1♂, with same data as holotype and barcode label SEMC 1008466 (SEMC); **Coquimbo (R-IV):** 1♀, 2♂♂, Coquimbo: Tilama, X-24-1971 [24 October 1971], Rozen & Pena // SEMC 1008463–1008465 (SEMC); 1♀, Elqui: El Tofo, Llande [Llano de la] Higuera, Nov.17, 1991, J.G. Rozen, L. Pena & A. Ugarte // SEMC 1008479 (SEMC); 2♀♀, 2♂♂, Elqui Prov., S 30°09′14.2″, W 70°39′50.6″, 11–30.IX.2004 [11–30 September 2004], Pangue (PCYU).

Additional material (n = 6♀♀, 22♂♂): Chile: **Atacama (R-III):** 1♀, W of Junta del Toro, 41-CH, km 137, -29.96568, -70.20154, 1716 m, 17.x–14.xii.2013 [17 October–14 December 2013], J. Postlethwaite & S. Monckton (PCYU); 2♀♀, 8 km W of Domeyko (c-500), -28.97934, -70.97232, 659 m, 15.x–30.xii.2014 [15 October–30 December 2014], J. Postlethwaite (PCYU); 1♀, 4♂♂, -28.01883, -70.55381, 488 m, 22–25.x.2010 [22–25 October 2010], pan traps, L. Packer (PCYU); 2♂♂, Rd. to Pircas Negras, km 8, -28.12614, -69.76213, 2086 m, 6.xi–11.xii.2013 [6 November–11 December 2013], blue [trap], S. Monckton & J. Postlethwaite (PCYU); 1♂, Rd. to Pircas Negras, km 16, -28.06649, -69.73631, 2277 m, 20.x–12.xii.2013 [20 October–12 December 2013], J. Postlethwaite & S. Monckton (PCYU); 1♂, Rd. to La Serrilla, c-493, km 10.5, -28.24885, -69.74290, 2500 m, 6.xi–10.xii.2013 [6 November–10 December 2013], S. Monckton & J. Postlethwaite (PCYU); **Coquimbo (R-IV):** 1♀, Los Lavadores, -30.29961, -70.62728, 1396 m, 10–19.ix.2010 [10–19 September 2010], L. Packer (PCYU); 1♀, 1♂, same as previous except 19.ix.2010 [19 September 2010], L. Packer (1♀ PCYU, 1♂ PUCV); 1♂, Panam km 232.5, -31.85161, -71.51435, 70 m, 2.ii.2016 [2 February 2016], L. Packer (PCYU); 2♂♂, Hwy 5, N of La Higuera, 20.x.2009 [20 October 2009], net, J. Gibbs (1♂ PCYU, 1♂ MNHN); 1♂, 1.1 km S on road to Tololo Obs., S30.3058, W70.8151, 11–22.x.2009 [11–22 October 2009], J. Gibbs (PCYU); 1♂, S. of Tongoy, R-440, km 5, -30.32008, -71.46635, 124 m, 12.x.2013 [12 October 2013], S. Monckton (PCYU); 3♂♂, Rd. to Playa Blanca, -30.22739, -71.45116, 143 m, 12.x.2013 [12 October 2013], S. Monckton (2♂♂ PCYU, 1♂ BBSL); 4♂♂, same as previous except 18.x.2013 [18 October 2013], S. Monckton (3♂♂ PCYU, 1♂ SEMC); 1♂, Morrillos Ruta 5, km 458, -30.15394, -71.36885, 27 m, 9.xi.2013 [9 November 2013], S. Monckton (PCYU).

Etymology: The specific epithet is derived from *confusus* (Latin, "disordered"), and in reference to the morphological similarity of this species with *S. herbsti*, with which it is easily confused.

Distribution: Chile: Atacama (R-III): Huasco; Coquimbo (R-IV): Tilama, Elqui.

Comments: This species appears to be partially sympatric with *S. herbsti* in Coquimbo. In addition to the characters indicated in the keys and diagnosis, the female of this species differs from that of *S. herbsti* in the inner orbits of the compound eyes, which are slightly divergent ventrally in *S. confusa* and subparallel or nearly so in *S. herbsti*.

Spinoliella herbsti (Friese)

Figure 8

Camptopoeum herbsti Friese, 1916: 163 (syntypes ♀♂, ZMHB, seen: Valparaíso, Concon, Chile).

Spinoliella herbsti (Friese): Toro and Ruz, 1972a: 149.

Diagnosis: This species can be recognized easily by the following combination of features: large body size (6–10 mm); female pygidial plate broad, with lateral margins converging toward apex at a 60° angle, apically bifid (fig. 8F); mesoscutum and mesoscutellum usually smooth and shiny (rarely weakly imbricate), with scattered punctures separated by at least a puncture width on disc (fig. 8C); female mesobasitarsus slender, 4.2× longer than broad; and metabasitibial plate not delimited by a border or carina (fig. 8D, E). It resembles *S. maculata* and *S. confusa* in the large body size and generally dark brown to black body color. However, in both sexes of *S. maculata* the mesoscutum and mesoscutellum are minutely punctate (sometimes appearing strongly imbricate at low magnifications) between large, coarse, setiferous punctures; the female pygidial plate is more pointed; and the female metabasitibial plate is delimited by a strong carina. In *S. confusa* the female pygidial plate is narrow, with sides converging at 40° angle (fig. 6F), the metabasitibial plate is delimited by a strong carina in both sexes (albeit not as well defined in the male), and the male mesoscutum and mesoscutellum are minutely, shallowly punctate between large, coarse, setiferous punctures. Also, the apex of the male pygidal plate is more acute in *S. confusa* than in that of *S. herbsti*.

Type material examined: Syntype ♀, Chile, Concon bei Valparaiso, 4 Dezember 1910, Herbst leg. (ZMHB).

Material examined (n = 45♀♀, 73♂♂): Chile: **Coquimbo (R-IV):** 3♀♀, 10♂♂, Region IV, Qda. Los Litres SW of Tongoy, coast road, 26.x.01 [26 October 2001], Packer & Fraser (1♀, 8♂♂ PCYU, 2♀♀, 2♂♂ SEMC); 5♀♀, 2♂♂, same as previous except inland rd., 24.x.01 [24 October 2001] (PCYU); 1♀, Elqui Prov; Quebrada El Arrayán, 15 km S La Villa, 30°6.27′S, 70°59.41′W, 472 m; 14.x.2003 [14 October 2003]; pan trap; FD Parker, M. Irwin; FDP#5504 (BBSL); 1♂, Elqui Prov., 17 km S Coquimbo, x-4-1994 [4 October 1994], Rozen, Quinter, Ascher (SEMC); 2♀♀, 1♂, Pr. Coquimbo, Carretera Pan-Am a1, sur de La Serena, Int. Biol. Program, 1970–72, leg. A.R. Moldenke (SEMC); 1♀, La Serena, Valle Elqui, Coquimbo Prov., xi.16.1964 [16 November 1964], L.E. Peña (SEMC); 1♂, Coquimbo, Llano de la Higuera, N of El Tofo, x.14.1971 [14 October 1971], Rozen & Peña (SEMC); 3♀♀, Tongoy, 5.x.02 [5 October 2002], J. Grixti & A. Zayed (PCYU); 2♀♀, 14♂♂, same as previous except hill, S30°15.25′, W71°30.30′, 10.x.2002 [10 October 2002] // on *Cristaria* (PCYU); 6♀♀, same as previous except bright yellow pans, 14.xi.2002 [14 November 2002] (4♀♀ PCYU, 2♀♀ AMNH); 3♀♀, 12♂♂, same as previous except bright blue pans (3♀♀, 11♂♂ PCYU, 1♂ AMNH); 2♀♀, 7♂♂, same as previous except white pans (1♀, 7♂♂ PCYU, 1♀ AMNH); 1♀, 5♂♂, Tongoy Arda Costanera, 26.x.01 [26 October 2001], Packer & Fraser (1♀, 3♂♂ PCYU, 2♂♂ AMNH); 4♂♂, same as previous except 25.x.01 [25 October 2001] (PCYU); 1♀, Los Vilos, 11.xi.01 [11 November 2001], R.E. Owen (PCYU); 1♂, same as previous except Caleta Los Lobos, 26.x.01 [26 October 2001], L. Packer & Fraser (PCYU); 1♀, 1♂, nr. Tonogy camping, S30°15.87′, W71°29.63′, 14.xi.2002 [14 November 2002] // on *Cristaria* (PCYU); 2♀♀, 4♂♂, 14 km W of Barrancas, nr Guanaqueros, 10.x.00 [10 October 2000], L. Packer (PCYU); 1♂, 9 km S Vicuña, -30.0444,-70.81889, 600 m, 7.x.2008 [7 October 2008], K.S. Ramos, PCYU-KCC-10018 (PCYU); 3♀♀, 4♂♂, Rd to Playa Blanca, -30.22739, -71.45116, 143 m, 18.x.2013 [18 October 2013], S. Monckton (PCYU); 1♀, S of Tongoy,

FIGURE 8. *Spinoliella herbsti* (Friese) from Elqui Province, Coquimbo, Chile (SEMC). **A.** Detail of female frons. **B.** Female metatibial spurs. **C.** Detail of female mesoscutum, mesoscutellum, and metanotum in dorsal view. **D.** Female metabasitibial plate. **E.** Male metabasitibial plate. **F.** Female pygidial plate.

R-440, km 6.5, -30.27196, -71.48252, 20 m, 18.x.2013 [18 October 2013], S. Monckton (PCYU); 2♀♀, 1♂, W of Guanaqueros, km 10, -30.24076, -71.44662, 67 m, 18.x.2013 [18 October 2013], S. Monckton (PCYU); 1♀, Morrillos Ruta 5, km 458, -30.15394, -71.36885, 27 m, 9.xi.2013 [9 November 2013], S. Monckton (PCYU); 1♀, 1.1 km S on road to Tololo Obs., S30.3058, W70.8151, 11–22.x.2009 [11–2 October 2009], J. Gibbs (PCYU); 3♂♂, Coast S of Los Vilos, -31.93100, -71.51349, 8 m, 10.xi.2013 [10 November 2013], S. Monckton (PCYU); 1♂, Rd to Los Choros, -29.34297, -71.15532, 232 m, 8.xi–13.xii.2013 [8 Novem-

ber–13 December 2013], S. Monckton & J. Postlethwaite (PCYU); 1♀, 1♂, Limari Prov, Fray Jorge Ntl Park, Queb. Las Vacas, 2 km NW Admin, 1–3Oct '97, pantrap Irwin/Schlinger 170 m, 30.6710°S, 71.6421°W (SEMC); **Valparaíso (R-V):** 3♀♀, 2♂♂, Pr. Aconcagua, Papudo/ Zapallar site, Int. Biol. Program, leg. A.R. Moldenke (SEMC).

Distribution: Chile: Coquimbo (R-IV): Coquimbo, Elqui, Limari; Valparaíso (R-V): Valparaíso.

Floral record: *Cristaria* sp. (Malvaceae).

Comments: The following variations, sometimes among specimens from the same locality, were noted in the color of the body pubescence as well as in the yellow or sometimes cream integumental maculation: pubescence ranging from yellowish, light reddish brown to white; pronotal lobe sometimes maculate; distal margin of mesoscutellum and metanotum with thin yellow band sometimes diffuse (often absent in the male); tibiae and tarsi dark reddish brown with reduced maculation or entirely yellow; and discs of female T3–T5 with bands often medially interrupted. Specimens of both sexes from Tongoy (Elqui Province) are sometimes lighter in color than specimens from other localities, particularly in the legs (tibiae and tarsi largely yellow) and metasoma (light reddish brown with cream maculation). Some males from the Province of Limari (Region IV) are significantly larger (~10 mm in body length), with the inner compound eye orbits distinctly diverging ventrally; also, the mesoscutum and mesoscutellum are weakly imbricate in some specimens and thus they are easily confused with *S. confusa*. However, in *S. confusa* the mesoscutum and mesoscutellum are minutely punctate, the apex of the pygidial plate is more acute, and the metabasitibial plate is bordered by a strong ridge and is sparsely punctate on the disc (metabasitibial plate bordered by a weak ridge and densely punctate in *S. herbsti*).

Spinoliella herbsti occurs in central Chile whereas *S. confusa* occurs toward the north, in regions III and IV. Both species appear to occur in sympatry in Coquimbo (Region IV).

Spinoliella incudinotata Compagnucci

Figure 9

Spinoliella incudinotata Compagnucci, 2015: 78 (holotype ♀, MACN: Neuquén, Argentina).

Diagnosis: This Argentinean species can be recognized by the following combination of traits: small body size (5–6 mm); frons, mesoscutum, mesoscutellum, and propodeum weakly shiny, strongly imbricate-reticulate among large, setiferous punctures (fig. 9A, B); most of tibiae and tarsi of all legs entirely yellow; forewing with membrane hyaline, pterostigma, and veins light yellow; metabasitibial plate in both sexes asetose on disc, not delimited by a distinct border or carina; metanotum maculate; terga usually light reddish brown (fig. 9C), contrasting with the black head and mesosoma; and male T2–T5 with depressed marginal zones densely covered by long, appressed, minutely branched white setae laterally (appearing as poorly developed fasciae: fig. 9C). It resembles *S. aidae* and *S. tadeyi* in the small body size; however, in those species the female mesobasitarsus is more robust, at most 3.5× longer than broad (slender, at least 3.9× longer than broad in *S. incudinotata*), and in both sexes the head and mesosoma are largely impunctate in the first species and densely punctate in the second. The body color is similar to that of *S. rufiventris*, but this species is larger (6.0–7.0 mm in body length), the forewing membrane is yellowish with the pterostigma and veins brownish, and the male T2–T5 have depressed marginal zones with minute, appressed, simple, light ferruginous setae throughout.

Material examined (n = 21♀♀, 25♂♂): Argentina: **Catamarca:** 4♀♀, 3♂♂, San Fernando, November 3–6, 1989, J.G. Rozen & A. Roig // on mallow (AMNH, SEMC); 1♀, 1♂, same as previous except Nov. 30–Dec 1, 1989 (AMNH); 2♂♂, same as previous except March 7, 1990 //on *Leconophera heterophylla* [sic: *Lecanophora heterophylla*] (AMNH); 1♂, Rio Belen, 17 Oct 97, pan traps, M. Irwin, F. Parker, S. Roig,

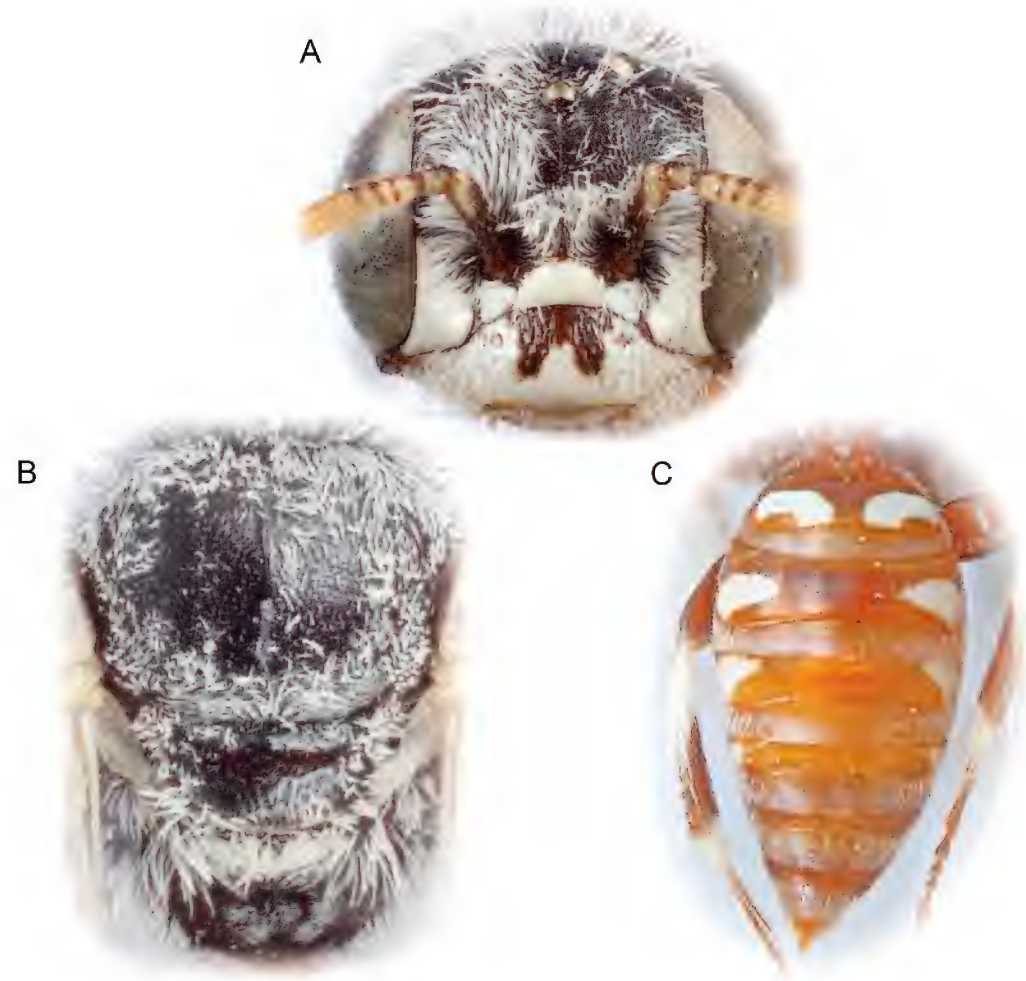

FIGURE 9. *Spinoliella incudinotata* Compagnucci from Catamarta, Argentina (SEMC). **A.** Female facial view. **B.** Female mesosoma in dorsal view. **C.** Male metasoma.

27.3065°S, 66.8938°W (collection); 1♀, 1♂, Punta Balasto, Fritz, I.92 [January 1992] (AMNH); 1♀, same as previous except Peña, 2.92 [February 1992] (AMNH); 2♀♀, Santa Maria, Punta Balasto, 40 km S., 24 I-1986 [24 January 1986], J.L. Neff // on flowers of *Leconophora heterophylla* [sic: *Lecanophora heterophylla*] // SEMC 1008551-52 (SEMC); 1♀, Punta de Balasto, February 10, 1983, Luis E. Peña, SEMC 1008555 (SEMC); 1♀, 3♂♂, Tinogasta, March 8, 1990, Rozen & Roig, on *Tarasa autofugastina* [sic: *Tarasa antofagastana*] (AMNH); 1♀, 1♂, 28 km SE Tinogasta, 15 Oct 1997, dunes, M. Irwin, F. Parker, S. Roig, 28.2450°S, 67.4557°W (1♀ BBSL, 1♂ SEMC); 2♀♀, same as previous except 15–19 Oct 97, malaise (BBSL); 1♂, same as previous except 20 Oct 1997, dunes (BBSL); **Mendoza:** 1♂, Mendoza, Malargüe: E. Soseanodo, 10 km S, 19-i-2000 [19 January 2000], J.L. Neff // on flowers of *Cristaria* sp. (SEMC); **Río Negro:** 5♀♀, 8♂♂, Rio Negro, Choele Choel, U. & M. Fritz, 12.97 [December 1997] // SEMC 1008505-06 (4♀♀, 6♂♂ AMNH, 1♀, 2♂♂ SEMC); **Salta:** 1♀, 2♂♂, NW, 10.II.2006 [10

February 2006], Salta Prov., Los Medanos, Cafayate env., Salta 155 km, SW S26°03′, W65°54′, Czech expedition 2006 (JSPC); **La Pampa:** 1♀, 1♂, Puelen, Nov 9, 1987, L. Peña (AMNH).

Distribution: Argentina: Catamarca, Mendoza, Neuquén, Río Negro, Salta, and La Pampa. Localities from Neuquén were not among material we examined (refer to Compagnucci, 2015).

Floral records: *Cristaria* sp.; *Lecanophora heterophylla* (Cav.) Krapov.; *Tarasa antofagastana* (Phil.) Krapov. (all Malvaceae).

Comments: This species was previously known from Neuquén and Catamarca. The additional records presented here suggest a wider distribution in sand dunes as indicated on some specimen labels. The metasoma in some specimens is dark brown, not light reddish brown or orange. Males with this coloration will run in the key to the Chilean species *S. rozeni* because of the small body size. In addition to their geographical distribution, they can be easily separated by the sculpturing of the mesoscutum and mesoscutellum, which are duller than in *S. incudinotata* and with contiguous, minute punctures or alveoli.

Spinoliella longirostris Toro

Figure 10

Spinoliella (*Spinoliella*) *longirostris* Toro, 1995: 105 (holotype ♂, AMNH, seen: Qda. De Taltal, Region II, Chile).

Diagnosis: This species can be recognized easily by the following combination of features: small body size (5–6 mm); clypeus, in facial view, distinctly projected ventrally in both sexes (fig. 10), beginning at about the inferior tangent of compound eyes in the male and projecting by more than half its length in the female; male glossa distinctly long, surpassing posterior margin of procoxae in repose; female pygidial plate narrow, with lateral margins converging toward apex at a 40° angle, narrowly rounded at apex; frons, mesoscutum, and mesoscutellum finely, contiguously punctate to alveolate, punctures or alveoli often faint on female mesoscutellar disc (thus appearing weakly imbricate); female mesobasitarsus robust, about 3.0× longer than broad; metabasitibial plate depressed on disc, setose, delimited by a strong border or carina in the female, flat, asetose, and without distinct border in the male; and female outer metatibial spur distinctly curved apically. It resembles *S. aidae*, *S. tadeyi*, and *S. psamita* in the small body size and general body color. However, in the female of the first two species the pygidial plate is apically bifid and the outer metatibial spur is apically straight; in the female of *S. psamita* the clypeus projects below the inferior tangent of the compound eyes by about one-half its length and the facial maculations are often abundant (reduced to nearly absent in *S. longirostris*). The male of *S. longirostris* can be separated easily from that of those species and any other *Spinoliella* by the distinctive clypeus and long glossa.

Type material examined (n = 1♀, 2♂♂): Holotype ♂, Chile, Región II [Antofagasta], Qda. de Taltal, 20-x-1993 [20 October 1993], E. Chiappa (AMNH). Allotype ♀, Chile, Región II [Antofagasta], 20 km N. Paposo, 27-x-1993 [27 October 1993], E. Chiappa (AMNH). Paratype 1♂, Chile, Región II [Antofagasta], 20 km N. Paposo, 13-ix-1993 [13 September 1993], E. Chiappa, en *Nolana paradoxa* (AMNH).

Material examined (n = 1♀, 10♂♂): Chile: **Tarapacá (R-I):** 1♀, 2♂♂ Region I, E. Pozo Almonte, -20.27720, -69.23552, 2358 m, 17.x.2013 [17 May 2013] (PCYU); **Atacama (R-III):** 1♂, 46 km E, Diego de A [Almagro] [Chañaral Province, Atacama], *Nolana* (PCYU); 1♂, Region III, Chañaral Pan. Am. Hwy km 1005, 24.x.01 [24 October 2001], L.Packer (PCYU); 4♂♂, Potrerillos turnoff km 1.7, 19.x.2015 [19 October 2015], L. Packer, ex. *Nolana* (1♂ PCYU, 1♂, MNHN, 1♂ PUCV, 1♂ SEMC); 1♂, W. of Potrerillos, -26.40334, -69.60739, 1805 m, 19.x.2015 [19 October 2015], L. Packer, ex. *Nolana* (PCYU);

FIGURE 10. Male of *Spinoliella longirostris* Toro from Q. Paposo, Region II, Chile (AMNH). **A.** Facial view. **B.** Lateral view of head.

1♂, Cuesta Montandon, -26.45214, -69.33440, 2771 m, 19.x.2015 [19 October 2015], L. Packer (PCYU).

Distribution: Chile: Tarapacá (R-I): Tamarugal; Antofagasta (R-II): Antofagasta; Atacama (R-III): Chañaral.

Floral records: *Nolana paradoxa* Lindl. (Solanaceae); *Cistanthe salsoloides* (Barnéoud) Carolin ex M.A. Hershkovitz (Portulacaceae); *Cristaria gracilis* Gay (Malvaceae) (Toro, 1995).

Spinoliella maculata (Spinola)

Figure 11

Camptopaeum [sic] *maculatum* Spinola, 1851: 197 (syntypes ♀♂, MSNT, seen: central and northern provinces, Chile).

Camptopoeum difficile Friese, 1916: 165 (syntypes ♀♂, ZMHB, AMNH, seen: Concon, Chile).

Camptopoeum reedi Cockerell, 1917: 165 (syntypes ♀♂, USNM, seen: Santiago, Chile).

Spinoliella maculata (Spinola); Michener, 1953: 35.

Ruizapis maculata (Spinola); Herrera and Etcheverry, 1960: 64.

Diagnosis: This species can be recognized easily by the following combination of traits: large body size (8–9 mm); female pygidial plate broad, with lateral margins converging toward apex at a 60° angle, apically bifid; frons, mesoscutum and mesoscutellum with minute, contiguous punctures among scattered, larger setiferous punctures (fig. 11D); female mesobasitarsus slender, about 3.5× longer than broad; metabasitibial plate slightly depressed and asetose on disc, delimited by a distinct border or carina in the female (fig. 11B), that of male flat, with scattered, minute setae on disc and without a distinct border (fig. 11C); depressed apical margins of T5 and T6 covered by decumbent setae, except at most on apical third; and female outer metatibial spur straight apically. It closely resembles *S. opaca* and *S. propinqua* in the body size, female pygidial plate apically bifid, sculpturing of frons and mesoscutum, and general body color (dark brown to black with lateral spots on basal four terga). However, in *S. opaca* the facial fovea is weakly impressed, about the same width across its length in the female, and as an inverted teardrop in the male (in *S. maculata* the facial fovea is strongly impressed, forming a groove, and

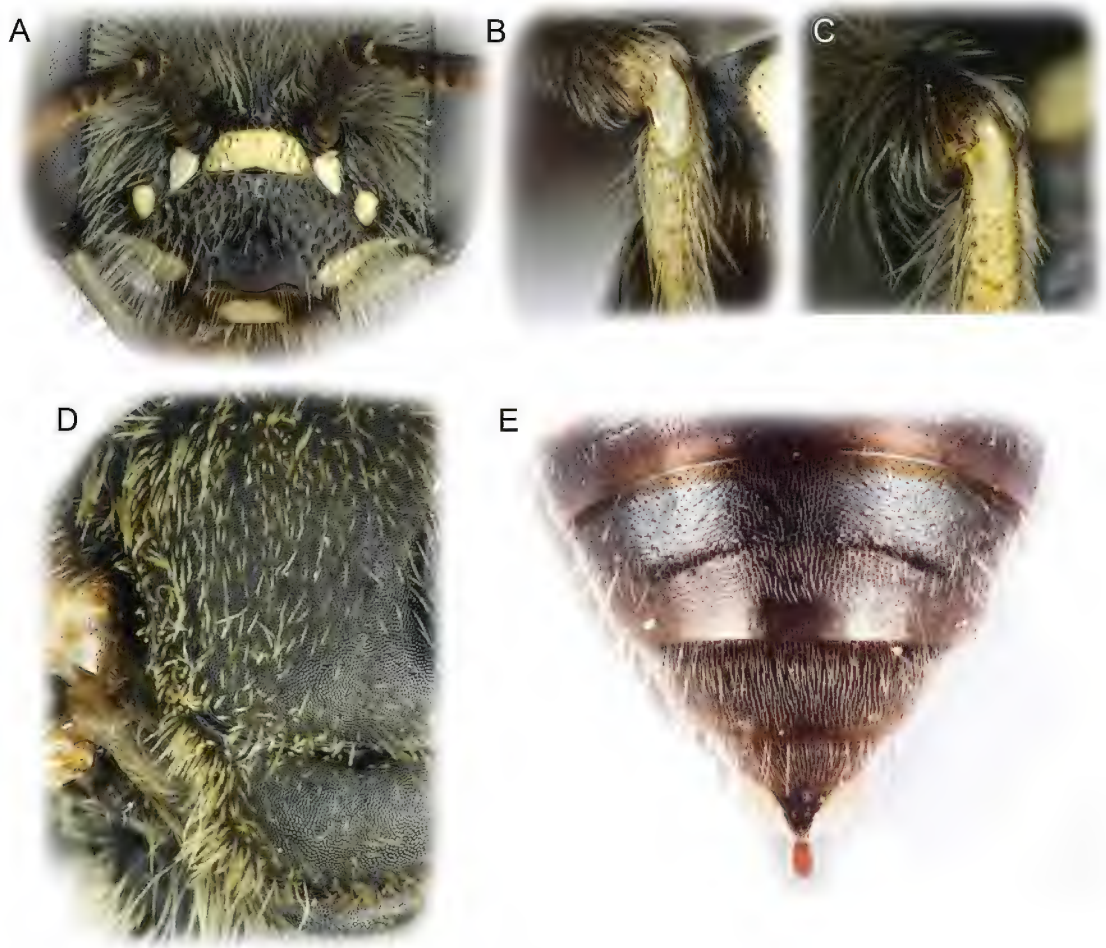

FIGURE 11. *Spinoliella maculata* (Spinola) from Los Vilos, Coquimbo, Chile (SEMC). **A.** Detail of female clypeus. **B.** Male metabasitibial plate. **C.** Female metabasitibial plate. **D.** Detail of female mesoscutum and mesoscutellum in dorsal view. **E.** Male terminal metasomal terga.

medially wider in the female, elongate in the male); the apical margins of terga are translucent in both sexes; the distal margin of clypeus is straight (medially projected in *S. maculata*); the male clypeus projects about one-half width of the compound eye in profile view (about one-third in *S. maculata*); and the male labrum has coarse punctures on its distal half (more finely punctate in *S. maculata*) (see also comparative comments for *S. opaca*). *Spinoliella propinqua* can be separated by the mesoscutum and mesoscutellum shinier in the female, with micropunctures shallow and often faint, particularly on the disc of mesoscutum; the apex of the pygidial plate more acute in both sexes; and depressed apical margins of T5 and T6 largely asetose, decumbent setae present at most on basal half.

TYPE MATERIAL EXAMINED (n = 4♀♀, 2♂♂): Syntype ♀ [*maculata*], [Chile] (MSNT). Syntype ♂ [*difficile*], Chile, Concon bei Valparaiso, 4 Dezember 1910, Herbst leg. (ZMHB). Syntype ♀ [*difficile*], Chile, Concon bei Valparaiso, 4 Dezember 1910, Herbst leg. (AMNH). Syntype ♀ [*reedi*], Chile, Santiago, E. Titus (USNM). Syntype ♀, ♂ [*reedi*], Chile, Santiago, E.C. Reed (USNM).

Material examined (n = 11♀♀, 18♂♂): Chile: **Coquimbo (R-IV):** 1♀, Coquimbo, Chigualoco, nr. Los Vilos, 12–14-x-1984 [12–14 October 1984], C. Porter & T. O'Neill // SEMC1008497 (SEMC); 2♀♀, 2♂♂, Region IV, Los Vilos, 31°55′256″, 071°31′019″ to 31°56′556″, 071°31′288″, 115–37 ft, Coastal path, 13.xii.06 [13 December 2006], L.Packer (PCYU); 7♂♂, Los Vilos, Caleta Los Lobos, 26.x.01 [26 October 2001], L. Packer & Fraser (PCYU); 1♂, same as previous except Choapa, Nov.18.1991, J.G. Rozen, L. Peña & A. Ugarte, on *Cristeria* [sic: *Cristaria*] (AMNH); 3♀♀, same as previous except Pichilemu, 34°23.1′S, 72°02′W, 04.Dec.2003, net, FD Parker, FDP#10887, 10909, 10925 // BBSL698198–200 (BBSL); 4♀♀, 3♂♂, Coqimbo [sic], Limari, Prov. Fundo Agua Amarilla, 7 km N. Los Vilos, 31.8493°S, 71.4933°W, 58 m, 11–28 Oct 2003, M.E Irwin, Malaise trap (3♀♀, 2♂♂ BBSL, 1♀, 1♂ SEMC); **Valparaíso (R-V):** 1♂, Região V, Concón, -32.916667, -71.5, 60 m, 21.x.2008 [21 October 2008], K.S. Ramos, PCYU-KCC-10045 (PCYU); **Maule (R-VII):** 3♂♂, Region VII, N. of Tregualemu, viaduct, 35°56′048″, 072°43′099″, 96 ft, 17.xii.06 [17 December 2006], L. Packer (PCYU); 1♂, same as previous except 35°56′948″, 072°44′613″, 93 ft (PCYU); **Región Metropolitana (R-M):** 1♀, Santiago, xii-1948 [December 1948] // SEMC1008495 (SEMC).

Distribution: Chile: Coquimbo (R-IV): Choapa, Limari; Valparaíso (R-V): Valparaíso; Región Metropolitana (RM): Santiago; Maule (R-VII).

Floral record: *Cristaria* sp. (Malvaceae).

Spinoliella nomadoides (Spinola)

Figure 12

Camptopaeum [sic] *nomadoides* Spinola 1851: 196 (syntype ♀♀, MSNT, seen: central and northern provinces, Chile).

Spinoliella nomadoides (Spinola); Ashmead, 1899: 86.

Diagnosis: This species can be distinguished by the combination of its larger body size (7–8 mm); compound eye inner orbits ventrally divergent in both sexes (fig. 12A, B); female pygidial plate narrow, with lateral margins converging toward apex at a 40° angle, apically truncate; male mandible arcuate, with small preapical tooth; frons, mesoscutum and mesoscutellum finely punctate to alveolate among large, scattered setiferous punctures, micropunctures or alveoli often faint on female mesoscutellar disc (thus appearing imbricate) (fig. 12C); female mesobasitarsus robust, about 3.3× longer than broad; metabasitibial plate depressed on disc, setose, delimited by a strong border or carina in both sexes (fig. 12E); female outer metatibial spur distinctly curved apically (fig. 12D); and metasoma light reddish brown distinctly contrasting with dark brown to black head and mesosoma. It resembles *S. rufiventris* and *S. ruzi* in the body color and size, and in the sculpturing of frons, mesoscutum and mesoscutellum; however, in those species the female pygidial plate is apically bifid, the metabasitibial plate is slightly depressed on the disc but not delimited by a strong border or carina, the female outer metatibial spur is apically straight, and the male mandible is straight, without a preapical tooth.

Type material examined: Syntype ♀, [Chile] (MSNT).

Material examined (n = 3♀♀, 6♂♂): Chile: **Atacama (R-III):** 2♂♂, Atacama, Q. Maitencillo, SW of Vallenar, October 11, 1980, Luis E. Peña // AMNH_BEE00194212 (1♂ AMNH, 1♂ SEMC); 1♂, Region III, Rd. N of Huasco, km 72, -27.88955, -71.08239, 216 m, 14.x–07.xi.2013 [14 May–7 June 2013], J. Postlethwaite & S. Monckton (PCYU); **Coquimbo (R-IV):** 2♀♀, Region IV, Caleta Los Hornos S of La Higuera, yellow pans, 11.x.97 [11 October 1997], L. Packer (PCYU); 1♀, Vicuña, 15-Oct-1972, H. Toro Col. // AMNH_BEE00194213 (AMNH); 1♂, same as previous except 18-Oct 1972, Cabezas Col. // AMNH_

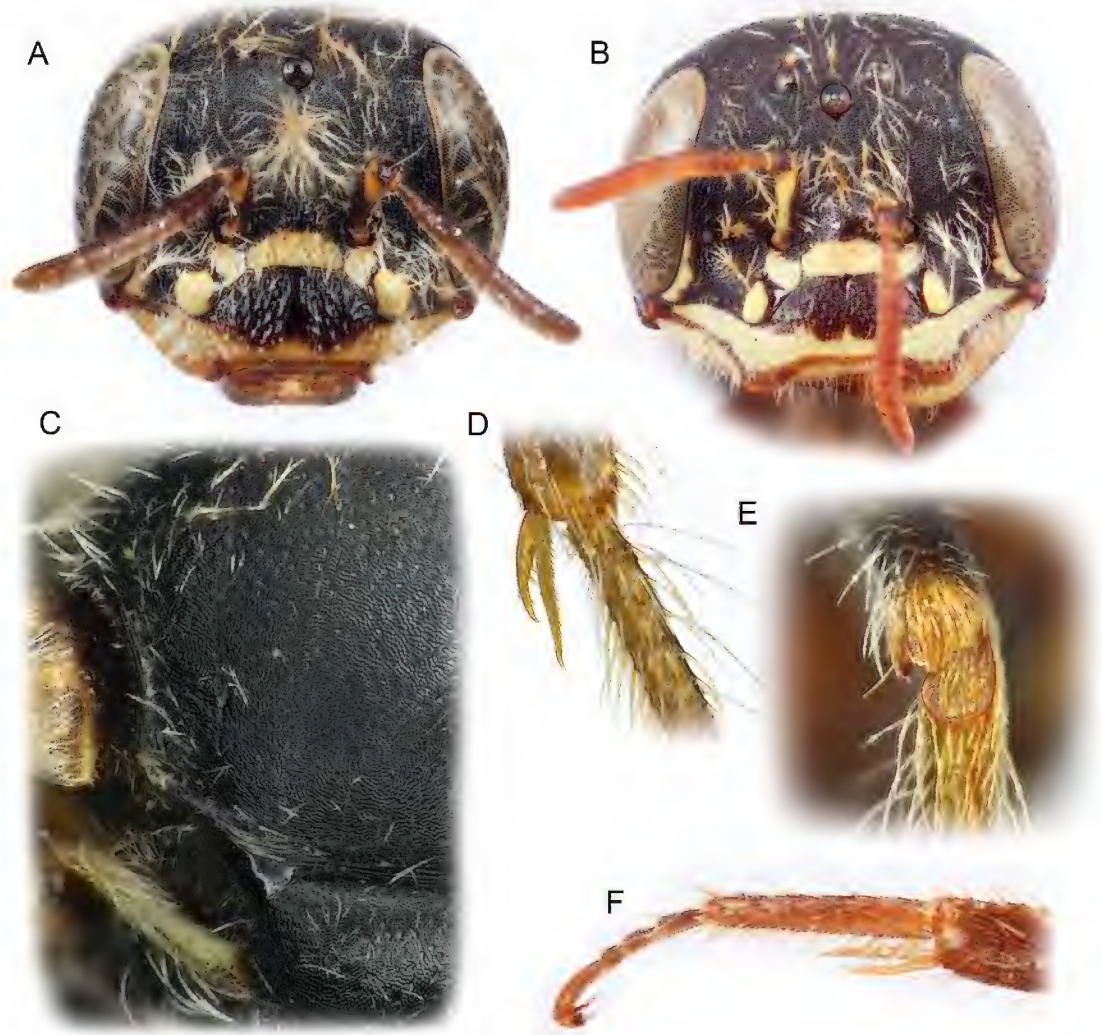

FIGURE 12. *Spinoliella nomadoides* (Spinola) from Coquimbo, Chile (AMNH). **A.** Female facial view. **B.** Male facial view. **C.** Detail of male mesoscutum and mesoscutellum in dorsal view. **D.** Female metatibial spurs. **E.** Female metabasitibial plate. **F.** Male metatibial spurs, metabasitarsus, remaining metatarsomeres, and pretarsus.

BEE00194211 (AMNH); 1♂, Elqui, km 6 S Vicuna, Oct 20, 1991, J.G. Rozen, L. Pena & A. Ugarte // AMNH_BEE00194210 (AMNH). **Bío Bío (R-VIII):** 1♂, Ñuble Prov., Las Trancas, 1200 m, L. Peña, on cactus flowers (SEMC).

Distribution: Chile: Atacama (R-III): Atacama; Coquimbo (R-IV): Elqui; Bío Bío (R-VIII): Ñuble.

Floral record: A single male has been captured at flowers of an unidentified species of cactus (Cactaceae).

Comments: The arcuate male mandible with a small preapical tooth of this species is unique among *Spinoliella*. Such a mandible resembles that of species of *Arhysosage* (see Engel, 2000).

Spinoliella obscura Compagnucci

Spinoliella obscura Compagnucci, 2015: 80 (holotype ♀, MACN: San Fernando, Catamarca, Argentina).

Diagnosis: The female of this Argentinean species can be recognized by the following combination of features: pygidial plate with apex rounded, not bifid; outer metatibial spur straight; frons, mesoscutum, and mesoscutellum smooth and shiny, largely impunctate; tibiae and tarsi yellow; and terga dark reddish brown with a small lateral spot on basal three terga. Based on the characters indicated in the original description, the male of this species will run to *S. aidae* in our key.

Material examined (n = 2♀♀): Argentina: **Catamarca:** 1♀, Catamarca, 10 km S. Copacabana near Tinogastra, 03-08-1990 [3 August 1990], Rozen & Roig-Alsina colls. (AMNH); **San Juan:** 1♀, 16 km W. Media Agua, 11-09-1998 [11 September 1998], Rozen & Navarrete colls., on plant # 1 (*Heliotropium*) (SEMC).

Distribution: Argentina: Catamarca, San Juan.

Floral record: *Heliotropium* L. (Boraginaceae).

Comments: This species was previously known from San Fernando, Catamarca, the type locality.

Spinoliella opaca Rodríguez, Toro, and Ruz

Figure 13

Spinoliella (*Peniella*) *opaca* Rodríguez, Toro, and Ruz, 2001: 101 (holotype ♂, PUCV, seen: Quebrada Los Choros, Coquimbo, Region IV, Chile).

Diagnosis: Both sexes of this species are most similar to *S. maculata* and *S. propinqua*. It can be separated from both species by the following combination of traits: T1–T5 with depressed apical margins semitranslucent (fig. 13C); facial fovea shallow, not forming a distinct groove, about the same width across its length in the female (fig. 13A), as an inverted teardrop in the male; male clypeus projecting about one-half width of compound eye in profile view; and male labrum with coarse punctures on its distal half (fig. 13B).

Type material examined (n = 1♀, 1♂): Holotype ♂, Chile, Región IV, Quebrada Los Choros, Coquimbo, 12-x-1977 [12 October 1977], E. de la Hoz (PUCV). Allotype ♀, Región IV, Choros Bajos, Coquimbo, 12-x-1977 [12 October 1977], J.C. Magunacelaya (PUCV).

Material examined (n = 164♀♀, 155♂♂): Chile: **Atacama (R-III):** 5♀♀, 1♂, Huasco Prov. [Atacama, Region III] 5 km N Incahuasi, rd to Mina Los Cristales 990 m, pantrap MIrwin/DYeates, 29.1899°S, 71.0204°W (5♀♀, 1♂ BBSL, 1♀ SEMC); 4♀♀, 9♂♂, Region III, Tres Playitas, 10 km N of Huasco Bajo, 13.x.01 [13 October 2001], L. Packer (PCYU); 1♀, 2♂♂, Region III, 11 km WNW Choros Bajos, 14.x.01 [14 October 2001], L. Packer (PCYU); 1♀, 1♂, Region III, Parque Nacional Llanos de Challe, Carrizal Bajo, 21.x.01 [21 October 2001], L. Packer (PCYU); 2♀♀, 1♂, Região III, Huasco Bajo, -28.454167, -71.179167, 10.x.2008 [10 October 2008], K.S. Ramos, PCYU-KCC10035-36 (PCYU); 1♂, Region III, NE Aguada de Tongoy, -28.51248, -71.16625, ix.14.2010 [14 September 2010], L. Packer, 110 m (PCYU); 1♀, Region III, Quebrada del Potrero, S26.85656, W70.66392, v-1-2010 [1 May 2010], Packer & Fraser, 348 m (PCYU); 12♀♀, 11♂♂, 8 km W of Domeyko (c-500), -28.97934, -70.97232, 669 m, 15.x–30.xi.2014 [15 October–30 November 2014], J. Postlethwaite (PCYU); 1♂, 7.3 km W of Domeyko, -28.97834, -70.96402, 648 m, 22.x.2010 [22 October 2010], L. Packer & E. Almeida (PCYU); 26♀♀, 26♂♂, Rd N of Huasco, km 18, -28.32476, -71.15281, 62 m, 14.x–17.xi.2013 [14 October–17 November 2013], J. Postlethwaite & S. Monckton (25♀♀, 25♂♂ PCYU, 1♀, 1♂ BBSL); 7♀♀, 2♂♂, Rd N of Huasco, km 39, -28.14721, -71.15618, 37 m, 14.x–7.xi.2013 [14 October–7 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, 1♂,

FIGURE 13. *Spinoliella opaca* Rodriguez, Toro, and Ruz from Los Choros, Chile (PCYU). **A.** Female facial view. **B.** Detail of male labrum. **C.** Female terminal metasomal terga.

Rd N of Huasco, km 11, -28.38215, -71.1625, 86 m, 19.x–7.xi.2013 [19 October–7 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, 4♂♂, Rd N of Huasco, km 52, -28.04383, -71.12875, 65 m, 14.x–7.xi.2013 [14 October–7 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, Rd N of Huasco, km 67.2, -27.92718, -71.08508, 169 m, 14.x–7.xi.2013 [14 October–7 November 2013], J. Postlethwaite & S. Monckton (PCYU); 4♀♀, 7♂♂, N of Huasco, -28.44019, -71.18803, 26 m, 1–14.x.2013 [1–14 October 2013], J. Postlethwaite & S. Monckton (3♀♀, 5♂♂ PCYU, 1♀, 2♂♂ SEMC); 1♂, same as previous except -28.44019, -71.18803, 26 m, 19.x.2013 [19 October 2013], S. Monckton (PCYU); 1♂, same as previous except -28.43612, -71.18459, 87 m, 1–14.x. 2013 [1–14 October 2013], blue cup, J. Postlethwaite & S. Monckton (PCYU); 1♂, same as previous except 14.x–7.xi. 2013 [14 October–7 November 2013], blue cup, S. Monckton & J. Postlethwaite (PCYU); 1♂, 1.8 km of Huasco Bajo, -28.4689, -71.1808, 19.x.2009 [19 October 2009], net, J. Gibbs (PCYU); 7♀♀, 7♂♂, Huasco Prov., Chañar de Aceituno, S29°01′40.6″, W71°24′13.0″, 20.ix.2003 [20 September 2003], A. Ugarte (PCYU); 3♀♀, 1♂, same as previous except S28°57′12.3″, W71°20’49.9″, 18.ix.2003 [18 September 2003], A. Ugarte (PCYU); 2♀♀, 1♂, Las Dunas de Los Choros, -29.24004, -71.43084, 20 m, 13.x–8. xi.2013 [13 October–8 November 2013], J. Postlethwaite & S. Monckton (PCYU); 2♂♂, same as previous except blue cup (PCYU); 1♂, Coleta Totoral, -27.85161, -71.08409, 14 m, 1–14.x.2013 [1–14 October 2013], J. Postlethwaite & S. Monckton (PCYU); 2♀♀, Caleta Carrizalillo, -29.10981, -71.4613, 11 m, 8.xi–13. xii.2013 [8 November–13 December 2013], S.

Monckton & J. Postlethwaite (PCYU); 9♀♀, 9♂♂, same as previous except 13.x–8.xi.2013 [13 October–8 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, E of Carrizalillo, c-500, km 53.3, -28.998822, -71.37874, 208 m, 8.xi–13.xii.2013 [8 November–13 December 2013], S. Monckton & J. Postlethwaite (PCYU); 1♂, same as previous except 13.x–8.xi.2013 [13 October–8 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, 1♂, Caleta Apolillado, 18 m, -29.1826, -71.48815, 8.xi–13.xii.2020 [sic: 2014] [8 November–13 December 2014], S. Monckton & J. Postlethwaite (PCYU); 1♂, same as previous except 13.x–8.xi.2013 [13 October–8 November 2013], J. Postlethwaite & S. Monckton (PCYU); **Coquimbo (R-IV):** 22♀♀, 17♂♂, Region IV, Los Choros, white pans, 25.x.2002 [25 October 2002], J. Grixti & A. Zayed (20♀♀, 15♂♂ PCYU, 2♀♀, 2♂♂ SEMC); 18♀♀, 10♂♂, same as previous except bright blue pans (15♀♀, 9♂♂ PCYU, 3♀♀, 1♂ AMNH); 2♂♂, same as previous except blue pans (1♂ PCYU, 1♂ AMNH); 3♀♀, 3♂♂, same as previous except yellow pans (PCYU); 2♂♂, same as previous except -29.31303, -71.29369, 13.ix.2010 [13 September 2010], 145 m, L. Packer (PCYU); 3♀♀, 6♂♂, Tongoy, bright blue plans, 14.xi.2002 [14 November 2002], J. Grixti & A. Zayed (PCYU); 1♀, same as previous except white pans (PCYU); 11♀♀, 6♂♂, Bahia Tongoy, S of Camping Conrad, 26.x.01 [26 October 2001], L. Packer (10♀♀, 5♂♂ PCYU, 1♀, 1♂ SEMC); 4♀♀, 1♂, same as previous except Qda. Los Litres coast road, 26.x.01 [26 October 2001], L. Packer (3♀♀, 1♂ PCYU, 1♀ SEMC); 6♀♀, 8♂♂, same as previous except sand dunes, Qda. Los Almendras, 24.x.01 [24 October 2001], Packer & Fraser (PCYU); 2♀♀, Region IV, 1 km W of Choros Bajos, 14.xi.01 [14 November 2001], L. Packer (AMNH); 1♀, Coquimbo, Choros Bajos, 22 October 1988, Luis E. Peña (SEMC); 1♂, Coquimbo, Los Loritos, N of Choros Bajos, 20 October 1983, Luis E. Peña (AMNH); 1♀, Coquimbo, El Topo [Tofo], 100 m, 6 November 1956, R. Wagenknecht (SEMC); 1♀, Elqui Prov., 17 km S Coquimbo, x-4-1994 [4 October 1994], Rozen, Quinter, Ascher (SEMC); 1♂, Region IV, W of Barrancas, 10.x.00 [10 October 2000], L. Packer (AMNH); 1♂, Region IV, 2km N. La Higuera, S29°29.61, W71°13.39′, 16.xi.2002 [16 November 2002], J. Grixti & A. Zayed (PCYU); 2♂♂, Carrizal Bajo, x.00 [October 2000], L. Packer (PCYU).

Distribution: Chile: Atacama (R-III): Huasco; Coquimbo (R-IV): Coquimbo, Elqui.

Comments: This species is easily recognized by the characters listed and illustrated in the original description (Rodríguez et al., 2001). Some specimens of both sexes from Tongoy (Region IV) are larger than those from other localities, and the metasomal terga of the female are also more maculated, with T2 to T4, and sometimes T5, having a complete band to a medially separated band (each tergum with sublateral maculation in *S. opaca* from other localities).

Spinoliella packeri Gonzalez and Engel, new species

Figures 14, 15

Diagnosis: Both sexes of this species are most similar to *S. psamita*. *Spinoliella packeri* can be separated from that species by the punctation of the mesoscutum and mesoscutellum, which is finely and contiguously punctate-alveolate among large, sparse setiferous punctures (fig. 14B). In *S. psamita* the punctures of both mesoscutum and mesoscutellum are fainter than in *S. packeri* (e.g., cf. fig. 19B), and thus it appears shinier and imbricate, particularly on the disc of mesoscutellum. Also, both sexes of *S. packeri* are larger than those of *S. psamita* (head width 1.6–1.9 vs. 1.4–1.6 mm), and maculation is often absent from the male metasoma of *S. packeri* (T1–T4 with large lateral maculation in *S. psamita*). The hypostomal projection in *S. packeri* is particularly strongly pronounced (fig. 15B), while in *S. psamita* it is present but much smaller.

FIGURE 14. Female holotype of *Spinoliella packeri* Gonzalez and Engel, new species. **A.** Facial view. **B.** Detail of mesosoma in dorsal view. **C.** Dorsal habitus. **D.** Metabasitibial plate. **E.** Lateral habitus.

DESCRIPTION: **Female.** Body length 6.5 mm (5.5–6.5 mm); forewing length 3.9 mm (3.8–3.9 mm); head width 1.7 mm (1.6–1.8 mm). Head 1.2× wider than long; inner orbits of compound eyes slightly diverging ventrally (fig. 14A); intertorular distance 2.5× OD, about 1.3× greater than torulorbital distance; torulus diameter about equal to OD; ocellocular distance 1.9× OD, about as long as ocelloccipital distance; interocellar distance 2.4× OD, 1.2× greater than ocellocular distance; compound eye about twice as long as wide; clypeus 2.9× broader than long, with apex surpassing inferior tangent of compound eyes by about half of its length, projected about 0.4× compound eye width in lateral view; gena 0.7× width of compound eye in profile, widest medially; inner subantennal sulcus about one-half length of outer subantennal sulcus;

facial fovea about 7.5× longer than broad, 1.8× longer than scape, deep, forming a groove, about 0.7× width of scape ventrally, progressively becoming narrower (0.5× width of scape) dorsally; scape 3.1× longer than broad; pedicel slightly shorter than F1, about as long as broad; F1 about twice as long as F2, slightly longer than broad; F2 about as long as F3; remaining flagellomeres broader than long, except last flagellomere longer than broad. Protibial spur with apical portion of rachis about two-thirds length of malus, with distinct row of eight elongate branches (not including apical portion of rachis); mesotibial spur straight, 0.6× mesobasitarsus length; mesobasitarsus robust, 2.7× longer than broad; metatibia 3.6× longer than broad; outer metatibial spur 0.6× length of inner, distinctly curved apically, inner spur straight, about 1.8× longer than outer spur; metabasitibial plate concave on disc, delimited by strong border (fig. 14D); metabasitarsus 5.0× longer than broad, about 0.6× length of metatibia. Pygidial plate with apex narrowly rounded, not bifid.

Head and mesosoma black (fig. 14A–C, 14E), except galea, maxillary and labial palpi yellow, apical half of mandibles and labrum (yellow) dark reddish brown, and cream to yellowish maculations as follows: mandible basally; clypeus except basally on disc; supraclypeal area; paraclypeal swelling; subantennal area; ventral surfaces of scape, pedicel, and flagellum; dorsal surface of pronotum with small lateral spot; pronotal lobe; distal margins of mesoscutellum and metanotum (entirely absent on both or with small maculation on metanotum); apices of femora; outer surface of protibia, apices and bases of meso- and metatibia; tarsi of all legs; humeral sclerite; T1 and T2 with medially interrupted bands, gap between bands about one-fourth to one-third of transversal width of lateral band (broadly separated on T2); T3–T5 each with a complete band notched medially on anterior margin (medially separated on T3 and T4, deeply notched to medially separated on T5). Terga dark brown on discs, distal margins translucent brownish; sterna light reddish brown with diffuse brown spots laterally. Tegula translucent yellowish; wing membranes brownish, with weak green and copper highlights, veins dark brown.

Body pubescence as described for *S. aidae* (see above).

Outer surface of mandible distally and basal area of labrum smooth and shiny, impunctate; clypeus imbricate among faint punctures on disc, becoming smooth and shiny apically, punctures separated by 1–2× a puncture width on disc, denser laterally; paraclypeal swelling and subantennal area impunctate; supraclypeal area imbricate as on base of clypeus, with small punctures separated by 1–2× a puncture width; lower paraocular area largely impunctate, with smaller and sparser punctures than on supraclypeal area; paraocular area lateral to facial fovea shiny, weakly imbricate with scattered setiferous punctures; remaining areas of face including vertex dull, minutely and contiguously punctate-alveolate among large, scattered (2–3× a puncture width) setiferous punctures; gena and hypostomal area shiny, imbricate with faint, scattered punctures. Mesoscutum and mesoscutellum weakly shiny, finely and contiguously punctate-alveolate among large, sparse (2–4× a puncture width) setiferous punctures (fig. 14D), as on face. Remaining areas of mesosoma, including legs, imbricate except mesepisternum dorsally and base of propodeum alveolate. Metasoma strongly imbricate with minute, scattered punctures on terga, punctures coarser and denser on sterna and terminal terga.

Male. As in female except pubescence longer and denser, clypeus and gena more strongly imbricate, and the following: body length 5.0–6.4 mm; forewing length 3.6–3.9 mm; head width 1.7–1.9 mm. Head 1.2–1.3× wider than long; ocellocular distance 2.1× OD, 0.7× ocelloccipital distance; compound eye 2.1× longer than wide; clypeus 3.2× broader than long, projected about 0.3× compound eye width in lateral view; gena 0.9× width of compound eye in profile; facial fovea weakly impressed, linear, slitlike, about 9.3× longer than broad, one-fourth width of

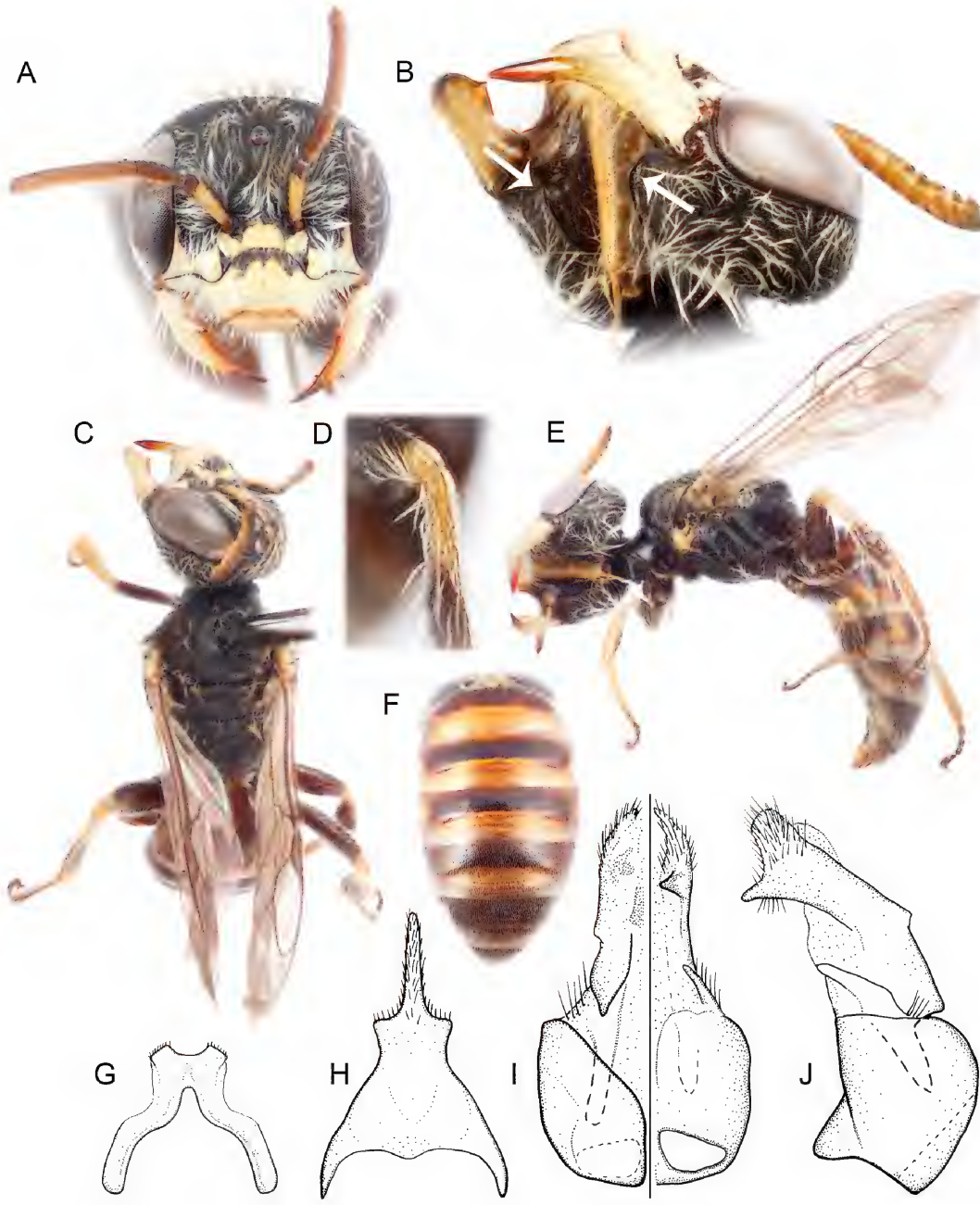

FIGURE 15. Male paratype of *Spinoliella packeri* Gonzalez and Engel, new species. **A.** Facial view. **B.** Ventral view of head showing hypostomal carina projecting anteriorly (arrows). **C.** Dorsal habitus. **D.** Metabasitibial plate. **E.** Lateral habitus. **F.** Metasoma in dorsal view. **G.** Metasomal S7. **H.** Metasomal S8. **I.** Genital capsule in dorsal (left half) and ventral (right half) views. **J.** Lateral aspect of genital capsule.

scape, 0.8× length of scape; scape 2.8× longer than broad; pedicel slightly longer than F1, F1 about as long as broad, slightly longer than F2 and F3 individually, F2 and F3 broader than long as remaining flagellomeres; hypostomal carina projecting anteriorly (fig. 15B); mandible with large, triangular basal tooth on upper margin (fig. 15A, B). Metatibia 4.3× longer than broad; mesobasitarsus 5.4× longer than broad; metabasitibial plate as in figure 15D; outer metatibial spur straight, inner spur about 1.6× longer than the outer. Pygidial plate with apex pointed. Metasomal S7, S8, and genital capsule as in figure 15G–J.

Metasoma dark brown to black often without distinct yellow or cream maculation, sometimes with small, diffuse maculations laterally on T2 and T3, depressed apical margins yellowish to light reddish brown, particularly on basal three terga (fig. 15F).

Holotype: ♀, Chile: Quebrada Cardones [Arica and Parinacota (R-XV)], -18.45698, -69.77264, 2378 m, 17.iv.2012 [17 April 2012], L. Packer (PCYU).

Paratypes (n = 20♀♀, 25♂♂): Chile: **Tarapacá (R-I):** 3♂♂, Region I, 71 km E Pozo Almonte, -20.29732, -69.14223, 2969 m, 14–21.iv.2012 [14–21 April 2012], pan trap, L. Packer (2♂♂ PCYU, 1♂ SEMC); **Arica and Parinacota (R-XV):** 3♀♀, 7♂♂, Quebrada Cardones, 2378 m, 13.v.2012 [13 May 2012], L. Packer (3♀♀, 6♂♂ PCYU, 1♂ SEMC); 1♂, same as previous except -18.45698, -69.77264, 17.iv.2012 [17 April 2012], 2378 m (PCYU); 3♀♀, same as previous except -18.44759, -69.76234, 2443 m, 17.vi.2012 [17 June 2012], pan trap (1♀ MNHN, 1♀ PUCV, 1♀ SEMC); 4♂♂, same as previous except 18.vi.2012 [18 June 2012] (PCYU); 2♀♀, same as previous except -18.4378, -69.74481, 2618 m, *Cacabus flavus* (PCYU); 4♂♂, same as previous except 17.iv.12 [17 April 2012] (PCYU); 8♀♀, 2♂♂, same as previous except 17.iv.2012 [17 April 2012], blue vane trap, L. Packer (2♀♀, 2♂♂ PCYU, 2♀♀ MNHN, 2♀♀ PUCV, 1♀ BBSL, 1♀ SEMC); 4♀♀, 4♂♂, same as previous except pan traps (PCYU).

Additional material: (n = 6♀♀, 34♂♂): Chile: **Tarapacá (R-I):** 4♀♀, 1♂, Region I, E. Pozo Almonte, -20.27720, -69.23552, 2358 m, 17.x.2013 [17 May 2013] (PCYU); 5♂♂, Mamina [Mamiña, Tarapacá], vertedero, -20.06175, -69.22181, 2660 m, 16–21.iv.2012 [16–21 April 2012], pan traps, L. Packer (PCYU); **Antofagasta (R-II):** 1♂, Region II, (WP: 77), E. of Calama, Hwy B-159, km 7, -22.34715, -68.34889, 3000 m, 02.iv–27.iv.2013 [2–27 April 2013], white cup, S. Monckton & J. Postlethwaite (PCYU); 1♂, Gautin near San Pedro de Atacama, S22°45, W06804, 3255m, pans, iv.04 [April 2004], L. Packer (PCYU); 1♂, NW of SP [San Pedro] de Atacama, 23-CH, km 87.6, -22.90294, -68.26608, 2573 m, 28.iv–03.v.2013 [28 April–3 May 2013], J. Postlethwaite & S. Monckton (PCYU); 1♂, E of SP [San Pedro] de Atacama, 27-CH, km 19.9, -22.91061, -68.00141, 3045 m, 24.i–6.iv.2013 [24 January–6 April 2013], lt. blue [light blue pan trap], J. Postlethwaite & S. Monckton (PCYU); 1♀, 4♂♂, (WP: 1115), 50 km SW of Peine, -24.09683, -68.29408, 3060 m, 02.iv.2013–01.v.2013 [2 April–1 May 2013], J. Postlethwaite & S. Monckton (PCYU); 1♂, W. of Talabre, 2852 m, -23.293, -67.943, 23.iv.2015 [23 April 2015], L. Packer (PCYU); 1♂, same as previous except 01.v.2013 [1 May 2013], L. Packer (PCYU); 3♂♂, Talabre Viejo, 28.iii.00 [28 March 2000], L. Packer (PCYU); **Arica and Parinacota (R-XV):** 5♂♂, Quebrada Cardones, -18.41266, -69.66638, 2942 m, 18–19.iv.2012 [18–19 April 2012], L. Packer, pans (4♂♂ PCYU, 1♂ BBSL); 5♂♂, same as previous except -18.46403, -69.80427, 2189 m, 17.iv-12.v.2012 [17 April–12 May 2012], blue vane trap, L. Packer (PCYU); 2♂♂, Quebrada Cardones, -18.45698, -69.77264, 2378 m, 17.iv.2012 [17 April 2012], L. Packer (PCYU); 2♂♂, Hwy 11, 74.5 km, -18.44759, -69.76234, 2443 m, 18.iv.2012 [18 April 2012], L. Packer, pan traps (PCYU); 1♀, 1♂, Hwy 11, 65 km, -18.47355, -69.84498, 1935 m, 19.iv-12.v.2012 [19 April–12 May 2012], blue vane trap, L. Packer (PCYU).

ETYMOLOGY: The specific epithet honors Laurence Packer, friend and colleague who not only collected the type series but also contributed significant material for our work.

DISTRIBUTION: Chile: Tarapacá (R-I): Tamarugal; Antofagasta (R-II): El Loa; Arica and Parinacota (R-XV).

FLORAL RECORD: *Cacabus flavus* I.M. Johnst. (Solanaceae).

COMMENTS: Some male and female specimens from Talabre Viejo and Peine (Region II) are distinctively smaller than specimens from regions I and XV. The head width in these specimens is about 75% of the head width of specimens from other localities. The sculpturing of the mesoscutum and frons is also slightly coarser. Besides these differences, we did not find other features (i.e., pygidial and metabasitibial plates, male genitalia, and hidden metasomal sterna) that reliably separate them from *S. packeri*. Thus, we tentatively assigned them to that species.

Spinoliella polita Gonzalez and Engel, new species

Figure 16

DIAGNOSIS: This Chilean species, known only from the female, is most similar to *S. rufiventris* and *S. ruzi* in body size, the bifid pygidial plate (fig. 16F), and the orange metasoma that contrasts with the dark brown to black head and mesosoma (fig. 16B, C). It can be easily separated from these species by the sculpturing of mesoscutum and mesoscutellum, which is faintly imbricate to smooth and shiny among setiferous punctures (fig. 16D). In *S. rufiventris* and *S. ruzi* both mesoscutum and mesoscutellum are dull, with contiguous, minute punctures or alveoli among larger, coarser setiferous punctures (e.g., fig. 20B).

DESCRIPTION: **Female.** Total body length 7.1 mm; forewing length 4.4 mm; head width 2.2 mm. Head 1.2× wider than long; inner orbits of compound eyes parallel or nearly so (fig. 16A); intertorular distance 2.6× OD, about 1.3× greater than torulorbital distance; torulus diameter about equal to OD; ocellocular distance 2.3× OD, subequal to ocelloccipital distance; interocellar distance 2.5× OD, slightly longer (1.1) than ocellocular distance; compound eye about 2× as long as wide; clypeus 2.7× broader than long, with apex surpassing inferior tangent of compound eyes by about one-half its length, projected about 0.4× compound eye width in lateral view; gena 0.9× width of compound eye in profile, widest medially; inner subantennal sulcus about one-half length of outer subantennal sulcus; facial fovea about 7.0× longer than broad, weakly impressed, not forming a deep goove, about the same width (0.6× width of scape) across its length, 1.4× longer than scape; scape 3.1× longer than broad; pedicel about as long as F1, about as long as broad; F1 1.2× longer than broad, 1.5× longer than F2 and F3 individually; remaining flagellomeres broader than long, except last flagellomere longer than broad. Protibial spur with apical portion of rachis about two-thirds length of malus, with distinct row of seven elongate branches (not including apical portion of rachis); mesotibial spur straight, 0.6× mesobasitarsus length; mesobasitarsus robust, about 2.8× longer than broad; metabasitibial plate slightly concave on disc, delimited by strong border (fig. 16E); metatibia 4.0× longer than broad; metatibial spurs straight, inner spur about 1.5× longer than the outer spur; metabasitarsus 7.1× longer than broad, about 0.6× length of metatibia. Pygidial plate with lateral margins converging toward apex at 40° angle, apex bifid.

Head and mesosoma dark reddish brown except black on face, mesoscutum, mesoscutellum, and most of propodeum (fig. 16B, C). Cream maculation as follows (fig. 16A, B): mandible except on apical half; labrum except on apical third; clypeus except basally on disc; supraclypeal area; lower paraocular area including paraclypeal swelling; subantennal area;

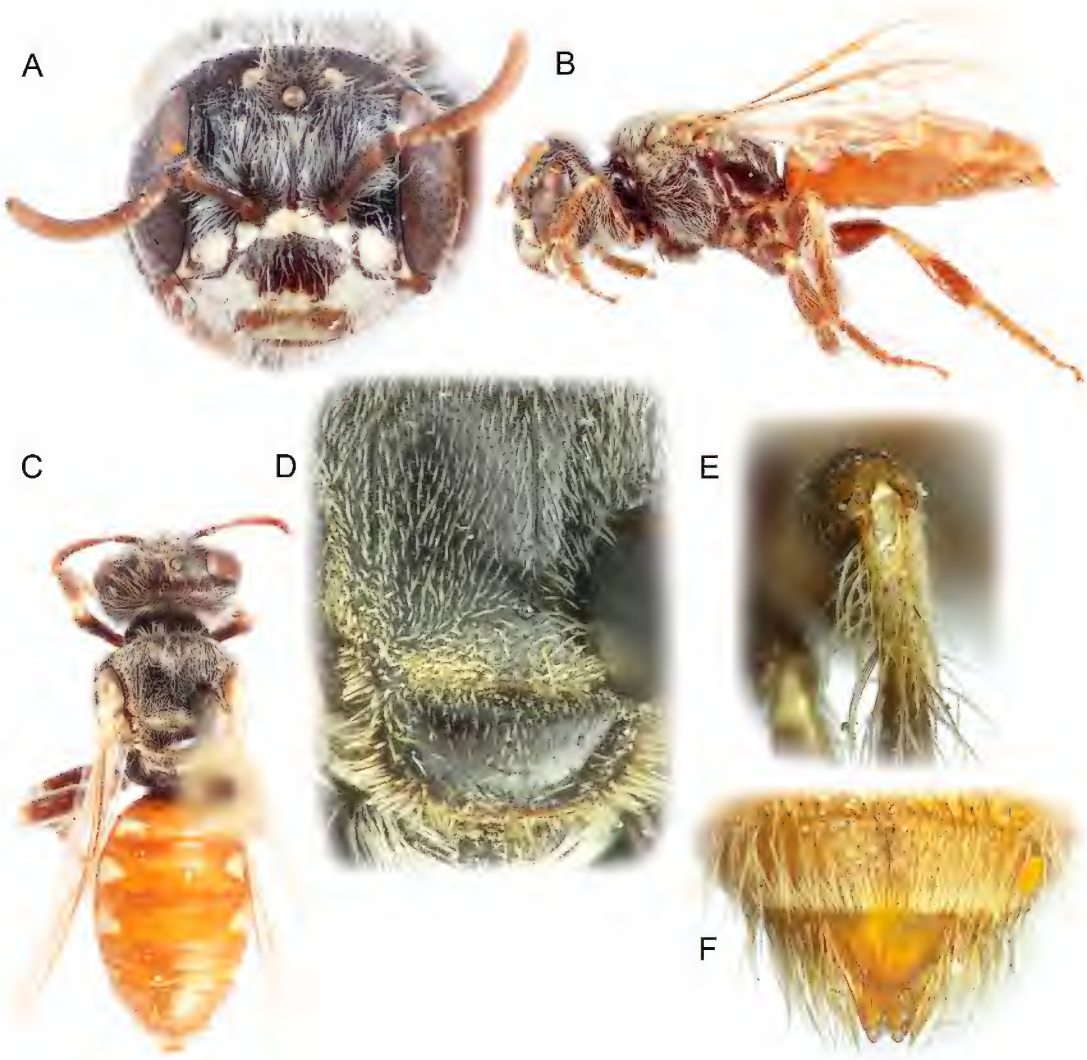

FIGURE 16. Female holotype of *Spinoliella polita* Gonzalez and Engel, new species. **A.** Facial view. **B.** Lateral habitus. **C.** Dorsal habitus. **D.** Detail of mesoscutum and mesoscutellum in dorsal view. **E.** Metabasitibial plate. **F.** Pygidial plate.

humeral sclerite; mesoscutellum with thin band on distal margin; bases of tibiae; T1–T4 each with lateral spot (fig. 16B, C). Metasoma orange except dark brown on lateral fovea of T2 (fig. 16B, C). Tegula translucent yellow; wing membranes subhyaline, slightly yellowish, with weak green and copper highlights, veins (R darkest), prestigma, and pterostigma light brown.

Body pubescence whitish except off-white on vertex and tarsi of all legs. Head and mesosoma with minutely branched setae denser on frons and mesoscutum; ventral margin of mandible, labrum, mesepisternum ventrally, tarsi of all legs, and outer surface of metatibia with simple, stiff setae; setae longer (at least 2× OD) on ventral margin of mandible, hypostomal area, protro-

chanter, profemur, posterior margin of metabasitarsus, T5 and T6. Metasomal terga and sterna with minute, appressed, sparse setae, becoming longer toward apical terga and sterna.

Outer surface of mandible distally and basal area of labrum smooth and shiny, impunctate; clypeus smooth and shiny, with faint punctures separated by a puncture width or more, punctures absent midapically, denser laterally; paraclypeal swelling and subantennal area largely impunctate; supraclypeal area smooth and shiny, laterally with scattered, small, faint punctures as on lower paraocular area; paraocular area, lateral to torulus, and lower half of frons shiny, with minute, faint punctures among coarse setiferous punctures separated by one or two times 1–2× a puncture width; remaining areas of face, including vertex, dull, minutely punctate with sparser setiferous punctures than on lower half of frons; paraocular area, lateral to facial fovea, smooth and shiny with coarse, small punctures along orbital margin; gena smooth and shiny, with small, faint punctures separated by at least two puncture widths, punctures coarser, denser on hypostomal area. Mesosoma, including legs, weakly imbricate between punctures, except discs of mesoscutum and mesoscutellum smooth and shiny and propodeal triangle alveolate. Mesoscutum with setiferous punctures separated by 1–3× a puncture width (fig. 16D); mesoscutellum largely impunctate on disc (fig. 16D), with smaller and sparser setiferous punctures than on mesoscutum. Metasomal terga and sterna weakly imbricate with minute, scattered punctures, coarser and denser on sterna and terminal terga.

Holotype: ♀, Chile: Curicó [Maule (R-VII)]: Río Teno, Cordillera Curicó, 800 m, November 25-29, 1981, Luis E. Peña (SEMC).

Etymology: The epithet specific is derived from *politus* (Latin, "made smooth"), and in reference to the shiny, nearly smooth integument of the mesoscutum and mesoscutellum that characterizes this species.

Distribution: This species is known only from the type locality in Maule (R-VII), Chile.

Spinoliella propinqua Gonzalez and Engel, new species

Figures 17, 18

Diagnosis: This species is most similar to *S. maculata*. The female can be separated from that species by the sculpturing of the discs of the mesoscutum and mesoscutellum, which are shiny, with micropuntures shallow and often faint (fig. 17F), and thus appearing imbricate particularly on disc of mesoscutellum (mesoscutum and mesoscutellum dull, minutely and contiguously punctate among large, setiferous punctures in *S. maculata*: fig. 11D), and the pygidial plate narrow, with lateral margins converging toward apex at a 50° angle (fig. 17G) (lateral margins converging toward apex at a 60° angle in *S. maculata*). The male can be separated by the pubescence of the depressed apical margins of T5 and T6, which are largely asetose with decumbent setae present only on at most basal half (largely covered by decumbent setae except on apical third in *S. maculata*). Also, both sexes of *S. maculata* are slightly larger (*S. propinqua*: head width, female 2.3 mm, male 2.5 mm; *S. maculata*, female 2.5 mm, male 2.9 mm).

Description: **Female.** Total body length 8.2 mm (7.7–8.8 mm); forewing length 5.3 mm (4.8–5.7 mm); head width 2.3 mm (2.1–2.5 mm). Head 1.3× wider than long; inner orbits of compound eyes subparallel (fig. 17A); intertorular distance 2.8× OD, about 1.2× greater than torulorbital distance; torulus diameter about equal to OD; ocellocular distance 2.5× OD, about as long as ocelloccipital distance; interocellar distance 2.4× OD, about as long as ocellocular distance; compound eye 2.3× longer than wide; clypeus medially projected on distal margin (fig. 17B), 2.8× broader than long, with apex surpassing inferior tangent of compound eyes by about one-half its length, projected about 0.4× compound eye width in lateral view; gena 0.7× width of compound eye in profile, widest medially; inner subantennal sulcus about one-half length of outer subantennal sulcus; facial fovea deep, forming a groove,

FIGURE 17. Female holotype of *Spinoliella propinqua* Gonzalez and Engel, new species. **A.** Facial view. **B.** Detail of clypeus. **C.** Metabasitibial plate. **D.** Lateral habitus. **E.** Dorsal habitus. **F.** Detail of mesoscutum and mesoscutellum in dorsal view. **G.** Pygidial plate.

about same width along its length, 0.7× narrower than scape, about 6.2× longer than broad, 1.4× longer than scape; scape 3.1× longer than broad; pedicel slightly shorter than F1, about as long as broad; F1 1.6× longer than F2, 1.3× broader than long; F2 about as long as F3; remaining flagellomeres broader than long, except last flagellomere longer than broad. Protibial spur with apical portion of rachis about two-thirds length of malus, with distinct row of eight elongate branches (not including apical portion of rachis); mesotibial spur straight, about one-half mesobasitarsus length; mesobasitarsus slender, about 3.8× longer than broad; metatibial spurs straight, inner spur about 1.6× longer than the outer spur; metabasitibial plate

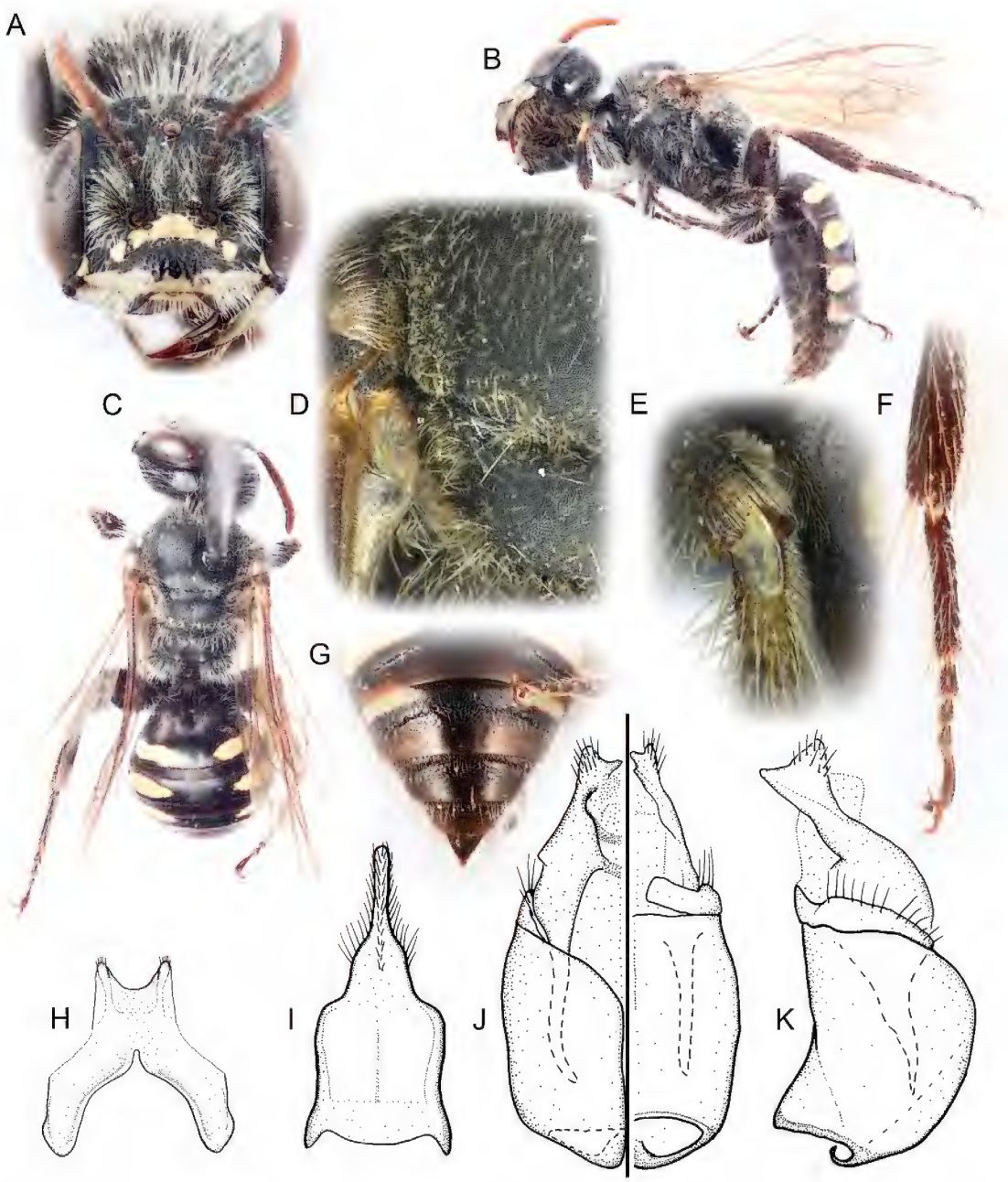

FIGURE 18. Male paratype of *Spinoliella propinqua* Gonzalez and Engel, new species. **A.** Facial view. **B.** Lateral habitus. **C.** Dorsal habitus. **D.** Detail of mesoscutum and mesoscutellum in dorsal view. **E.** Metabasitibial plate. **F.** Detail of apex of metatibia, metabasitarsus, remaining metatarsomeres, and pretarsus. **G.** Terminal metasomal terga. **H.** Metasomal S7. **I.** Metasomal S8. **J.** Genital capsule in dorsal (left half) and ventral (right half) views. **K.** Lateral aspect of genital capsule.

slightly concave on disc, delimited by strong border (fig. 17C); metatibia 4.2× longer than broad; metabasitarsus 7.7× longer than broad, about 0.6× length of metatibia. Pygidial plate with lateral margins converging toward apex at 40° angle, apex bifid (fig. 17G).

Head and mesosoma predominantly black (fig. 17D, E), legs and metasoma dark reddish brown (fig. 17D). Cream to yellowish maculation as follows (fig. 17A–B, D, E): mandible except apical half; labrum basally; clypeus except basally on disc and distal margin submedially; supraclypeal area; paraclypeal swelling; subantennal area; ventral surface of flagellum yellowish; dorsal surface of pronotum with small lateral spot; apex of pro- and metafemora; base of tibiae; T1–T5 each with a lateral band, gap between bands narrowest on T1 (about one-half width of transverse width of lateral band), widest on T2 (about 1.5× width of transverse width of lateral band). Tegula translucent brownish; wing membranes brownish, with weak green and copper highlights, veins dark brown.

Body pubescence as in *S. confusa*, except as follows: setae whitish except on vertex with dark brown to gray setae, and outer surfaces of metatibia and tarsi of all legs, and metasoma with light reddish brown setae.

Outer surface of mandible distally and basal area of labrum smooth and shiny, impunctate; clypeus smooth and shiny, with faint punctures separated by 1–2× a puncture width on disc, punctures absent preapically, denser laterally; paraclypeal swelling and subantennal area impunctate (fig. 17B); supraclypeal area smooth and shiny, laterally with scattered, small punctures as on lower paraocular area; remaining areas of face minutely punctate among large, scattered setiferous punctures, paraocular area lateral to torulus weakly shiny, with micropunctures faint to nearly absent lateral to facial fovea, integument otherwise dulled by micropunctation; gena smooth and shiny among scattered setiferous punctures separated by at least 2× a puncture width; hypostomal area faintly imbricate to smooth and shiny, setiferous punctures sparser than on gena. Mesosoma, including legs, generally faintly imbricate to smooth and shiny between punctures, except: tegula, mesoscutum and mesoscutellum minutely punctate among setiferous punctures, disc of mesoscutum with faint micropunctures and sparse setiferous punctures (fig. 17F) (separated by at least 2× a puncture width); dorsal and posterior surfaces of propodeum alveolate; mesepisternum and propodeum laterally strongly imbricate. Metasoma strongly imbricate with minute, scattered punctures on terga, punctures coarser and denser on sterna and terminal terga.

Male. As in female except pubescence longer and denser with brownish setae on mesoscutum, mesoscutellum, and propodeum; integumental tergal bands slightly more broadly separated medially (fig. 18C, G), and the following: total body length 7.7–8.5 mm; forewing length 5.2–5.7 mm; head width 2.3–2.6 mm. Head 1.3–1.4× wider than long; intertorular distance 2.7× OD, 1.1× greater than torulorbital distance; ocellocular distance about 0.7× ocelloccipital distance; interocellar distance about as long as ocellocular distance; compound eye 2.1× longer than wide; clypeus 3.9× broader than long; gena 0.9× width of compound eye in profile; facial fovea about 4.0× longer than broad, widest medially (0.5× width of scape), 0.6× length of scape; scape 3.0× longer than broad; pedicel slightly shorter (0.9×) than F1, 1.2× longer than long; F1 1.5× longer than broad, 1.7× longer than F2 and F3 individually. Protibial spur with apical portion of rachis about one-half length of malus, protibial spur with apical portion of rachis with distinct row of nine to 10 elongate branches; mesotibial spur 0.4× mesobasitarsus length; inner metatibial spur 1.3× longer than outer spur; metabasitibial plate delimited by weak border, not as strong as in female (fig. 18E); metabasitarsus 6.2× longer than broad (fig. 18F). Metasomal S7, S8, and genital capsule as in figure 18H–K.

Mesoscutum and mesoscutellum duller than in female, micropuntures well marked throughout. Metasomal sterna faintly imbricate to

smooth and shiny on discs, each coarsely, densely punctate laterally.

HOLOTYPE: ♀, Chile: Region VII [Maule], Lga del Maule [Laguna del Maule], Cuesta de los Condores, 35°57′461″[S], 070°34′844″[W], 29.xii.06 [29 December 2006], L. Packer (PCYU).

PARATYPES (*n* = 6♀♀, 7♂♂): CHILE: **Maule (R-VII):** 4♀♀, 4♂♂, with same data as holotype (1♀, 1♂ MNHN, 1♀, 1♂ PCYU, 1♀, 1♂ PUCV, 1♀, 1♂ SEMC); 1♀, 2♂♂, Region VII, NW of L. Maule [Laguna del Maule], 1435 m, S35.55086, W70.62662, 4.i.2009 [4 January 2009], L. Packer, *Andeimalva chilensis*, PCYUCHI09-6-2-009, 010, 011 (PCYU); 1♂, Region VII, Hwy 115 to L. Maule [Laguna del Maule], ~1900 m, 4.i.2009 [4 January 2009], L. Packer, *Andeimalva chilensis* (PCYU); 1♀, E. of Laguna del Maule, 1359 m, -35.90163, -70.64261, 6.i.2013, L. Packer, ex: *Primula* (PCYU).

ETYMOLOGY: The epithet specific is derived from *propinquus* (Latin, "neighboring"), and refers to its near resemblance to *S. maculata*.

DISTRIBUTION: Chile: Maule (R-VII).

FLORAL RECORDS: *Andeimalva chilensis* (Gay) J.A. Tate (Malvaceae); *Primula* sp. (Primulaceae).

COMMENTS: This species is known from only a couple of localities, which are at midelevations (1359–1900 m) in central Chile, and thus found at higher elevations than in *S. maculata* (11–900 m).

Spinoliella psamita Toro and Ruz

Figure 19

Spinoliella (*Spinoliella*) *psamita* Toro and Ruz, 1972a: 143 (holotype ♂, AMNH, seen: Travesia, Atacama, Chile).

DIAGNOSIS: This species can be distinguished by the following combination of features: small body size (5–6 mm); female pygidial plate broad, with lateral margins converging toward apex at a 50° angle, truncate at apex (fig. 19E); frons, mesoscutum, and mesoscutellum weakly shiny, finely alveolate, alveoli often faint, thus appearing imbricate, particularly on disc of mesoscutellum (fig. 19A, B); female mesobasitarsus robust, about 2.8× longer than broad; metabasitibial plate depressed on disc, setose, delimited by a strong border or carina in female (fig. 19C), rather flat, with scattered setae and without distinct border in male (fig. 19D); and female outer metatibial spur distinctly curved apically. This species resembles *S. aidae*, *S. tadeyi*, and *S. longirostris* in the small body size and general body color. However, in the female of the first two species the pygidial plate is apically bifid and the outer metatibial spur is apically straight; in the female of *S. longirostris* the clypeus projects below the inferior tangent of the compound eyes by more than one-half its length (at most one-half its length in *S. psamita*), and the facial maculation is often reduced to nearly absent (usually extensive in *S. psamita*). The male of *S. aidae* can be separated easily from that of *S. psamita* by the sculpturing of the frons, mesoscutum, and mesoscutellum, which are largely smooth and shiny with scattered punctures. The male of *S. psamita* can be separated from that of *S. longirostris* by the clypeus, which projects below the inferior tangent of the compound eye by about one-half its length (clypeus begins at inferior tangent of compound eye in *S. longirostris*), and by the normal glossa, not reaching the procoxae in repose (glossa is long and surpasses posterior margin of procoxae in *S. longirostris*). The male of *S. tadeyi* can be separated from both species by the forewing membrane whitish, with pterostigma and veins yellow, and the hypostomal carina not projecting anteriorly. *Spinoliella packeri* also resembles *S. psamita* in body color, shape of the metabasitibial plate, and the pygidial plate with a simple apex (not bifid). The former can be distinguished by its larger body size (head width 1.7 vs. 1.5 mm); frons, mesoscutum, and mesoscutellum duller, finely punctate throughout; female pygidial plate with pointed apex; and male terga largely dark brown to black, without yellow or cream maculation but with the distal margins of at least the basal three terga light

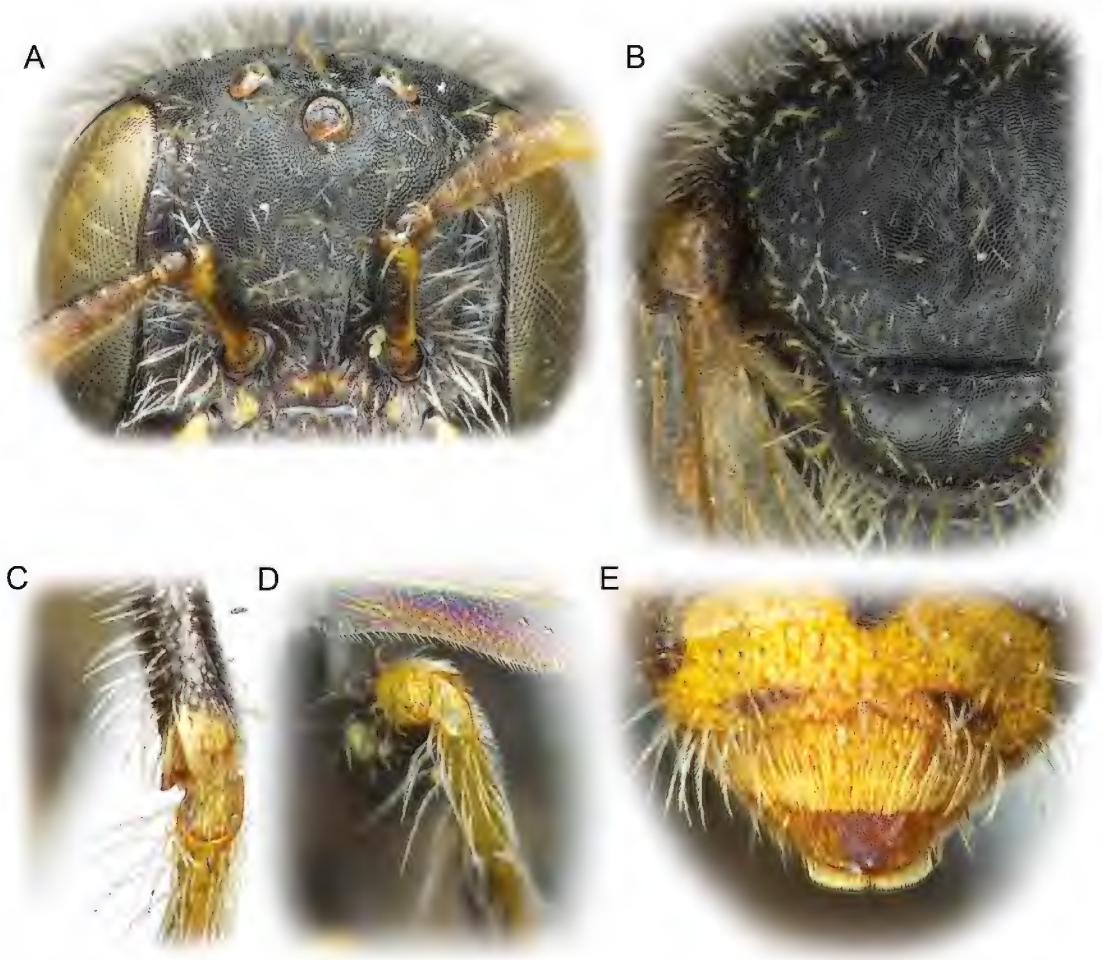

FIGURE 19. *Spinoliella psamita* Toro and Ruz from Atacama, Chile (SEMC). **A.** Detail of female frons. **B.** Detail of female mesoscutum and mesoscutellum in dorsal view. **C.** Female metabasitibial plate. **D.** Male metabasitibial plate. **E.** Female terminal metasomal terga.

reddish brown (terga in *S. psamita* with distinct yellow maculation laterally on basal four terga).

TYPE MATERIAL EXAMINED ($n = 2♀♀, 4♂♂$): Holotype ♂, Chile, Atacama, Travesía, Oct. 1969, col. Toro (AMNH). Paratypes: CHILE: **Antofagasta (R-II):** 1♂, Antofagasta, Taltal, leg. J.L. Neff, 1.x.1972 [1 October 1972], on *Oxalis* (AMNH); **Atacama (R-III):** 1♀, 1♂, Atacama, 26 mi. S Copiapo, x.19.1969 [19 October 1969], Rozen & Peña (1♀, 1♂ SEMC, 1♂ AMNH); 1♂, Atacama, 55 km S Copiapo, x.21.1971 [21 October 1971], Rozen & Peña (SEMC); 1♀, Atacama, Via Panam N of Caldera, leg. J.L. Neff, 2.x.1971 [2 October 1971], on *Nolana* (AMNH).

MATERIAL EXAMINED ($n = 27♀♀, 78♂♂$): CHILE: **Tarapacá (R-I):** 1♂, E. Pozo Almonte [Tamarugal Province], -20.27720, -69.23552, 2358 m, 17.x.2013 [17 October 2013], L. Packer (PCYU); **Antofagasta (R-II):** 1♀, 2♂♂, Region II, 13 km S, Paposo, S25°09.67′, W70°26.54′, 28.ix.2002 [28 September 2002], J. Grixti & A. Zayed // on *Nolana paradoxa* (PCYU); 4♀♀, 21♂♂, same as previous except 4.x.2002 [4 October 2002] (2♀♀, 19♂♂ PCYU, 2♀♀, 2♂♂

SEMC); 7♀♀, 5♂♂, same as previous except 5.x.2002 [5 October 2002] (PCYU); 1♀, 1♂, 5 km N of Paposo, 25.x.01 [25 October 2001], L. Packer (PCYU); 2♂♂, 13 km S of Paposo, blue pans, 29.ix–4.x.02 [29 September–4 October 2002], J. Grixti & A. Zayed (AMNH); 1♂, Hwy 1, N of Paposo, 43 m, -24.739, -70.561, 7.iv.2015 [7 April 2015], L. Packer (PCYU); 1♀, 35 km N of Paposo, -24.736, -70.567, 44 m, 7.v.2015 [7 May 2015], L. & L. Packer (PCYU); 2♂♂, N of Paposo, 72 m, -24.91492, -70.51951, 7.v–20.x.2015 [7 May–20 October 2015], L. Packer, bvt [blue vane trap] (PCYU); 3♀♀, 5♂♂ Punta Plata, 44 m, -24.73601, -70.56727, 7.v.2015 [7 May 2015], L. Packer, ex: *Nolana* (PCYU); 5♀♀, 5♂♂ SE of Punta Plata, 43 m, -24.73947, -70.56126, 7.v.2015 [7 May 2015], L. Packer (PCYU); 1♀, 2♂♂, Beach, 16 km N of Taital [Tai-Tal], yellow pans, 20.xi.02 [20 November 2002], J. Grixti & A. Zayed (1♀ PCYU, 2♂♂ AMNH); 10♂♂, Rt. 1, ~15 km N Tai Tal [Tai-Tal], -25.27824, -70.44476, 16 m, 15.x.2010 [15 October 2010], L. Packer & E. Almeida (PCYU); 2♂♂, N. of Taital [Tai-Tal], blue pans, 20.xi.02 [20 November 2002], J. Grixti & A. Zayed (PCYU); 1♂, SE of Taital [Tai-Tal], -25.51670, -70.41994, 625 m, 15.x.2010 [15 October 2010], L. Packer & E. Almeida (PCYU); **Atacama (R-III):** 4♂♂, N of Taital [Tai-Tal], 20. xi.2002 [20 November 2002], blue pan traps, A. Zayed & J. Grixti (PCYU); 1♀, 2♂♂, Region III, 6 km E Balneario Obispito, S26.78334, W70.7490, v-1-2010 [1 May 2010], Packer & Almeida, 809 m (PCYU); 1♂, Atacama: Mineral Atacama, NW Copiapó, 1100 m, October 4, 1980, Luis E. Peña (SEMC); 1♂, Nr. Alto de Carmen, -28.67773, -71.61343, ix-15-2010 [15 September 2010], L. Packer, 680 m (PCYU); 1♀, 1♂, Chañaral Pan Am. Hwy km 1005, 24.x.01 [24 October 2001], L. Packer (PCYU); 1♂, Huasco Prov., 5 km N Incahausi, rd to Mina Los Cristales 990 m, pantrap MIrwin/DYeates, 29.1899°S, 71.0204°W (BBSL); **Coquimbo (R-IV):** 8♂♂, Elqui Prov. [Region IV], Incahuasi, 1 Oct 1997, J.G. Rozen, H. Navarette (AMNH); 2♀♀, same as previous except X-1-97 [1 October 1997] (SEMC).

DISTRIBUTION: Chile: Tarapacá (R-I): Tamarugal; Antofagasta (R-II): Antofagasta; Atacama (R-III): Copiapó, Chañaral, Huasco; Coquimbo (R-IV): Elqui.

FLORAL RECORDS: *Alona rostrata* Lindl. (Solanaceae) (note that some authors today consider *Alona* a synonym of *Nolana*, and so this species can also be found under the latter generic name); *Cacabus flavus* I.M. Johnst. (Solanaceae); *Nolana paradoxa* Lindl. (Solanaceae); *Oxalis* sp. (Oxalidaceae).

COMMENTS: Both sexes of *S. psamita* often have yellow maculation on the labrum, distal half of clypeus, paraclypeal swelling, anterior surface of the scape, and lower paraocular, subantennal and supraclypeal areas; however, in specimens from Antofagasta such maculation is restricted to the paraclypeal swelling and anterior surface of the scape.

Spinoliella rozeni Toro and Ruz

Spinoliella (*Peniella*) *rozeni* Toro and Ruz, 1972a: 154 (holotype ♂, AMNH, seen: Travesia, Atacama, Chile]).

DIAGNOSIS: This species can be recognized by the following combination of features: small body size (5–7 mm); mesoscutum and mesocutellum weakly shiny with contiguous, minute punctures or alveoli among larger, sparser, and coarser setiferous punctures; distal margin of mesoscutellum and often entire metanotum yellow; terga with depressed apical margins semitranslucent; female pygidial plate bifid, with lateral margins straight, converging toward apex at a 40° angle; female facial fovea deep, forming a distinct groove, narrow ventrally and dorsally, medially as wide as scape; male facial fovea weakly impressed, about same width across length (about one-third width of scape); metabasitibial plate distinctly depressed on disc and delimited by weak border in female, that of male flat on disc, barely delimited by a border.

TYPE MATERIAL EXAMINED ($n = 2$♀♀, 4♂♂): Holotype ♂, Chile, Atacama, Travesía, Oct 1969,

col. Toro (AMNH). Paratypes: **Atacama (R-III):** 1♂, Atacama, 10 km N Algarrobal, x.20.1969 [20 October 1969], Rozen & Peña (AMNH); 1♀, 1♂, Atacama, Chacritas, x.14.1969 [14 October 1969], Rozen & Peña (1♀, 1♂ AMNH, 1♀ SEMC); 1♀, 1♂, Atacama, Castilla, x.22.1969, Rozen & Peña (SEMC).

Material examined (n = 126♀♀, 235♂♂): Chile: **Tarapacá (R-I):** 1♀, 1♂, Region I, La Tirana [Tarapacá Prov.], 29-IX-83 [29 November 1983] // DE LA HOZ, Col. CHILE (AMNH); **Antofagasta (R-II):** 1♀, Hwy 1, N of Paposo, 31 m, -24.836, -70.539, 7.iv.2015 [7 April 2015], L. Packer (PCYU); 1♂, NE Antofagasta, 451 m, -23.49783, -70.37572, 21.x.2015, L. Packer, ex *Nolana* (PCYU); **Atacama (R-III):** 25♀♀, 48♂♂, Region III, 11 km WNW Choros Bajos, 14.x.01 [14 October 2001], L. Packer (12♀♀, 45♂♂ PCYU, 13♀♀, 3♂♂ SEMC); 1♂, 13.5 km W Los Sapos, S28.01883, W70.55381, v-8-2010 [8 May 2010: note that the date of this specimen and the one that follows suggests a labeling error for this specimen, and it may have been collected in October (L. Packer, pers. comm.)], Packer & Fraser, 488 m (PCYU); 1♂, same as previous except -28.01883, -70.55381, 488 m, 8.x.2010 [8 October 2010], L. Packer & G.S. Fraser (PCYU); 2♂♂, Los Medanos, 29 m, -26.47419, -70.68528, [no date indicated], L. Packer, ex: *Cristaria* (PCYU); 6♀♀, 36♂♂, Caldera (north), -27.05709, -70.80511, 16 m, 17.x–30.xi.2014 [17 October–30 November 2014], J. Postlethwaite (PCYU); 1♂, Caldera (dump), -27.06306, -70.81092, 13 m, 17.x–30.xi.2014 [17 October–30 November 2014], J. Postlethwaite (PCYU); 1♀, 1♂, N of Punta de Choros, -29.22087, -71.46234, 24 m, 8.xi–13.xii.2013 [8 November–13 December 2013], J. Postlethwaite & S. Monckton (PCYU); 4♀♀, 2 km W of Domeyko (c-500), -28.96536, -70.91647, [15 October–30 November 2014], J. Postlethwaite (PCYU); 2♀♀, 11♂♂, 13.5 km W of Domeyko (c-500), -28.96813, -71.02254, 602 m, 15.x–30.xi.2014 [15 October–30 November 2014], J. Postlethwaite (PCYU); 4♀♀, 3♂♂, 13.5 km W of Domeyko, 602 m, -28.96813, -71.02254, 15.x.2014 [15 October 2014] [no collector indicated] (PCYU); 2♀♀, 5♂♂, 8 km W of Domeyko (c-500), -28.97394, -70.97232, 659 m, 15.x–30.xi.2014 [15 October–30 November 2014], J. Postlethwaite (PCYU); 1♀, Caleta Totoral, -27.85161, -71.08409, 14 m, 1–14.x.2013 [1–14 October 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, Caleta Apolillado, -29.1826, -71.48815, 18 m, 8.xi–13.xii.2015 [8 November–13 December 2015], S. Monckton & J. Postlethwaite (PCYU); 1♀, same as previous except -29.1826, -71.48815, 18 m, 13.x–8.xi.2013 [13 October–8 November 2013], J. Postlethwaite & S. Monckton (PCYU); 2♂♂, Quebrada Salada, Ruta 5, km 922.2, -26.73038, -70.73627, -5 m, 15.xi–10.xii.2013, J. Postlethwaite & S. Monckton (PCYU); 8♀♀, 5♂♂, Caleta Carrizalillo, -29.10891, -71.4613, 11 m, 13.x–8.xi.2013 [13 October–8 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, 1♂, E of Carrizalillo, C-500, km 53.3, -28.99822, -71.37874, 206 m, 8.xi–13.xii.2013 [8 November–13 December 2013], S. Monckton & J. Postlethwaite (PCYU); 1♂, N of Puerto Viejo, 11 m, -27.32221, -70.92273, 17.x.2014 [7 October 2014] (PCYU); 32♀♀, 68♂♂, -28.01883, -70.55381, 488 m, 22–25.x.2010 [22–25 October 2010], pan traps, L. Packer (PCYU); 5♀♀, 7♂♂, Tres Playitas, 10 km N of Huasco Bajo, 13.x.01 [13 October 2001], L. Packer (PCYU); 1♀, Atacama: Mineral Atacama, NW Copiapó, 1100 m, October 4, 1980, Luis E. Peña (SEMC); 2♀♀, 1♂, Huasco Prov., 5 km N Incahausi, rd to Mina Los Cristales 990 m, pantrap MIrwin/DYeates, 29.1899°S, 71.0204°W (BBSL); 1♀, 2♂♂, N of Huasco, -28.43612, -71.18459, 87 m, 14.x–17.xi.2013 [14 October–17 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♂, N of Huasco, -28.44019, -71.18803, 26 m, 1–14.x.2013 [1–14 October 2013], J. Postlethwaite & S. Monckton (PCYU); 3♀♀, same as previous except blue cup (PCYU); 1♀, 1♂, N of Huasco, -28.44019, -71.18803, 26 m, 14.x–7.xi.2013 [14 October–7 November 2013] S. Monckton & J. Postlethwaite (PCYU); 5♀♀, 11♂♂, Rd N of Huasco, km 18, -28.32476, -71.15281, 62 m, 14.x–17.xi.2013 [14

October–17 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, Rd N of Huasco, km 52, -28.04383, -71.12875, 65 m, 14.x–17.xi.2013 [14 October–17 November 2013], J. Postlethwaite & S. Monckton (PCYU); 4♀♀, 4♂♂, Rd N of Huasco, km 39, -28.14721, -71.15618, 37 m, 14.x–17.xi.2013 [14 October–17 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♂, Rd N of Huasco, km 67.2, -29.92718, -71.48508, 169 m, 14.x–17.xi.2013 [14 October–17 November 2013], J. Postlethwaite & S. Monckton (PCYU); 3♀♀, Chañaral, yellow pans, 13.xi.97 [13 November 1997], L. Packer (PCYU); 2♀♀, 2♂♂, same as previous except Chañar de Aceituno, S28°57′12.3″ W71°20′49.9″, 18.ix.2003 [18 November 2003], coll. A. Ugarte (PCYU); 1♂, Chañaral, 13.xi.97 [13 November 1997], L. Packer (PCYU); 1♀, 1♂, S of Chañarol [Chañaral], marker 930.32, -26.66496, -70.71722, 21 m, 8.ii–7.iv.2013 [8 February–7 April 2013], S. Monckton & J. Postlethwaite (PCYU); 3♂♂, S of Chañarol [Chañaral] Ruta 5, marker 956.5 km, -26.44667, -70.683114, -8 m, 28.ix–22.x.2013 [28 September–22 October 2013], S. Monckton & J. Postlethwaite (PCYU); 1♂, Chañarol: 13 km east Chañarol [Chañaral], November 4, 1992, Rozen, Sharkov, Snyder (SEMC); 1♀, 1♂, 12 km W Domeyko, X-5-1997 [5 October 1997], J.G. Rozen & H. Navarrette, on purple mallow (SEMC); 1♀, Copiapo: 85 km S Copiapo, Oct 23, 1991, J.G. Rozen & L. Peña, on *Cristellia* [sic: *Cristaria*] (SEMC); 1♂, same as previous except on *Cristeria* [sic: *Cristaria*] (SEMC); 1♂, Copiapó, Peña-X.91 [October 1991] (SEMC); **Coquimbo (R-IV):** 1♂, Elqui [Region IV]: El Tofo, Llande [Llano de la] Higuera, Nov 17, 1991, J.G. Rozen, L. Pena & A. Ugarte (AMNH); 1♂, Playa la Despensa, Caleta Los Hornos, 11.xi.97 [11 November 1997], L. Packer (PCYU); 2♂♂, Dunes, Los Choros, S29.31303, W71.29369, ix-13-2010 [13 September 2010], L. Packer, 145 m (PCYU); 9♀♀, 1♂, Las Dunas de Los Choros, -29.24004, -71.43084, 20 m, 13.x–8.xi.2013 [13 October–8 November 2013], J. Postlethwaite & S. Monckton (PCYU); 1♀, Los Choros, bright blue pans, 25.x.2002 [25 October 2002], J. Grixti & A. Zayed (PCYU); 1♂, Chañar, -30.2865, -70.6338, 22.x.2009 [22 October 2009], net, J. Gibbs (PCYU); 1♂, Rd to Playa Blanca, -30.22739, -71.45116, 143 m, 18.x.2013 [18 October 2013], S. Monckton (PCYU); 1♀, W of Junta del Toro, 41-CH, km 137, -29.96568, -70.20154, 1716 m, 17.x–14.xii.2013 [17 October–14 December 2013], J. Postlethwaite & S. Monckton (PCYU).

Distribution: Chile: Tarapacá (R-I); Antofagasta (R-II); Atacama (R-III): Huasco, Chañaral, Copiapó; Coquimbo (R-IV): Elqui.

Floral records: *Cristaria* sp. and unidentified "purple mallow" (Malvaceae); *Nolana* sp. (Solanaceae).

Comments: Both male and female specimens from Los Choros Bajos (R-III) have reduced yellow maculation on the scape, pedicel, pronotal lobe, and metanotum. These male specimens with reduced maculation might be confused with those of *S. opaca*, but they can be easily distinguished by the characters indicated in the key.

Spinoliella rufiventris Toro and Ruz

Figure 20A–E

Spinoliella (*Peniella*) *rufiventris* Toro and Ruz, 1972a: 151 (holotype ♂, SEMC, seen: Las Trancas, Ñuble, Chile).

Spinoliella (*Peniella*) *karhadra* Rodríguez, Toro, and Ruz, 2001: 104 (holotype ♂, PUCV, seen: Hualqui, Concepción, Region VIII, Chile). **New synonymy.**

Diagnosis: This species can be recognized by the following combination of traits: female pygidial plate broad, with lateral margins converging toward apex at a 50° angle, apically bifid; frons, mesoscutum, and mesoscutellum with minute, contiguous punctures (fig. 20A, B), often shallow and faint on mesoscutellar disc; female metabasitibial plate distinct (barely indicated in the male: fig. 20D), slightly depressed on disc but

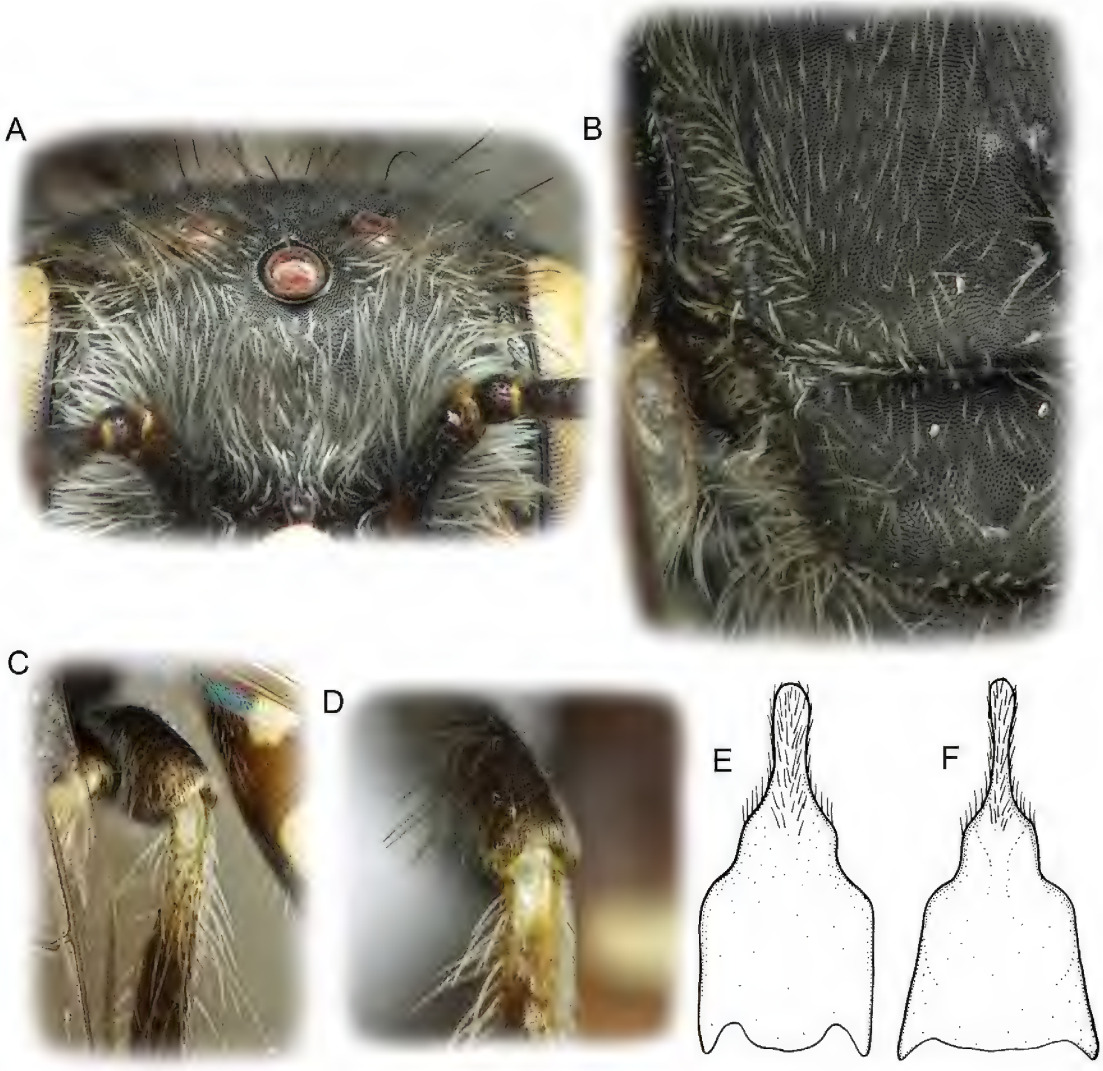

FIGURE 20. *Spinoliella rufiventris* Toro and Ruz (A-E) from Ñuble, Chile (SEMC) and male of *Spinoliella ruzi* Compagnucci (F) from Nahuel Huapi, Argentina (PCYU). **A.** Detail of female frons of *S. rufiventris*. **B.** Detail of female mesoscutum and mesoscutellum in dorsal view of *S. rufiventris*. **C.** Female metabasitibial plate of *S. rufiventris*. **D.** Male metabasitibial plate of *S. rufiventris*. **E.** Male metasomal S8 of S. *rufiventris*. **F.** Male metasomal S8 of *S. ruzi*.

not delimited by a strong border or carina (fig. 20C); and metasoma light reddish brown, often distinctly contrasting with dark brown to black head and mesosoma. It resembles *S. nomadoides* and *S. ruzi* in the body color and sculpturing of frons, mesoscutum, and mesoscutellum; however, in *S. nomadoides* the female pygidial plate is apically truncate, not bifid; the metabasitibial plate is delimited by a strong carina in both sexes; the female outer metatibial spur is distinctly curved apically (straight in *S. rufiventris*); and the male mandible is arcuate, with a small preapical tooth (straight and without a preapical tooth in *S. rufiventris*). The broader pygidial plate

of the female and more robust median process of male S8 (cf. figs. 20E and 20F) separate *S. rufiventris* from *S. ruzi*.

TYPE MATERIAL EXAMINED (*n* = 10♀♀, 8♂♂): Holotype ♂ [*rufiventris*], Chile, Las Trancas, Prov. Ñuble, 12-14-52 [14 December 1952], L.E. Peña (SEMC). Allotype ♀ [*rufiventris*], Las Trancas, Prov. Ñuble, 12-14-52 [14 December 1952], L.E. Peña (SEMC). Holotype ♂ [*karhadra*], Chile, Región III, Hualqui, 2-xi-1985, C. Vial (PUCV). Allotype ♀ [*karhadra*], same data as holotype of *S. karhadra* (PUCV). Paratypes [*rufiventris*]: **O'Higgins (R-VI):** 4♀♀, 2♂♂, Las Cabras [Region VI], XII 10–23 1954 [10–23 December 1954], 1100–1460 m, L.E Peña (SEMC); **Bío Bío (R-VIII):** 4♀♀, 4♂♂, Las Trancas, Prov. Ñuble, 12-14-52 [14 December 1952], L.E. Peña (SEMC).

MATERIAL EXAMINED (*n* = 26♀♀, 44♂♂): CHILE: **O'Higgins (R-VI):** 2♂♂, Las Cabras [Region VI], XII 10–23 1954 [10–23 December 1954], 1100–1460 m, L.E Peña (SEMC); **Maule (R-VII):** 1♀, Region VII, W of Laguna del Maule, 35°57′461″, 070°34′844″, 29.xii.06 [29 December 2006], L. Packer (PCYU); 1♂, Region VII, W of L. Maule, S35.96901, W70.56940, 1982 m, 4.i.2009 [4 January 2009], L. Packer, PCYU-CHI09-6-4-002 (PCYU); 1♀, E of Laguna del Maule, 1359 m, -35.90163, -70.64261, 6.i.2013 [6 January 2013], L. Packer, ex: *Primula* (PCYU); 1♂, same as previous except 160.120 km, 2505 m, -35.99282, -70.39911, 1.i.2013 [1 January 2013], blue pan traps, L. Packer, R. Smith (PCYU); 1♂, Laguna del Maule, -36.020519, -70.500163, 2364 m, 29.xii.2006–27.i.2007 [29 December 2006–27 January 2007], pans, L. Packer, A.I. & M. Gravel (PCYU); 1♂, same as previous except 1955 m, -35.96881, -70.56934, 6.i.2012 [6 January 2012], L. Packer, R. Smith (PCYU); 1♂, N of Laguna del Maule, 29. xii.2006–27.i.2007 [29 December 2006–27 January 2007], pans, L. Packer, A.I. & M. Gravel (PCYU); 2♂♂, Laguna del Teno, -35.10666, -70.53926, 26.i.2016 [26 January 2016], 2548 m, L. Packer (PCYU); 4♂♂, Curicó prov. El Planchón, 34°08′57.8″S, 70°31.49.2″W, 2400, 1–5. ii.2003 [1–5 February 2003], leg. A. Ugarte P. (PCYU); **Bío Bío (R-VIII):** 7♀♀, 12♂♂, Shangri-La [Region VIII], -36.89764, -74.76026, 1335 m, 27.xii.2006 [27 December 2006], pan traps, L. Packer (6♀♀, 11♂♂ PCYU, 1♀, 1♂ SEMC); 1♂, same as previous except 1331 m, -36.89719, -71.47636, 5.i.2013 [5 January 2013], L. Packer, R. Smith (PCYU); 1♀, 1♂, Region VIII, Shangri-La, 4436 ft, 36°53′897″, 071°28′637″, 11.xii.06 [11 December 2006], L. Packer pans (PCYU); 1♂, Shangrilá, XII-1998 [December 1998], A. Ugarte P (SEMC); 2♀♀, 1♂, Ñuble, Chillán, Las Trancas, 1100 m, Jan 1987, L. Peña (AMNH); 2♂♂, Las Trancas, Prov. Ñuble, 12-14-52, L.E. Peña [14 December 1952] (SEMC); 5♀♀, 4♂♂, Termas de Chillan, -36.916642, -71.425488, 1543 m, 24.i.2007 [24 January 2007], L. Packer (PCYU); 4♀♀, 4♂♂, Las Trancas, 1200 m, L. Peña, on cactus flowers (SEMC); 1♀, 2♂♂, Las Trancas, 78 km E Chillan; 36°54.5′S, 71°29′W, 12.XII.2003 [12 December 2003]; pan trap; FD Parker; FDP#3748, 3762, 3772 (BBSL); 2♂♂, Las Trancas, 1300 m, December 13–16, 1976, L.E. Peña (SEMC); 1♀, Las Trancas, SE Recinto, in Chillan area, January 1987, Luis E. Peña (SEMC); 1♀, Chillan area, Shangri La, Las Trancas E. Recinto, Jan 20, 1979, Luis E. Peña (SEMC); 1♀, same as previous except January 19–22, 1979 (SEMC); **Araucanía (R-IX):** 1♀, Region IX, 37.809°S, 71.016°W, Parque Nacional de Nahuelbuta, 3860 ft, 6–9.i.2000 [6–9 January 2000], W. Webb & D. Yeates (PCYU); **Región Metropolitana (RM):** 1♂, Region Metro [Santiago Metropolitan Region, Cordillera Province], Termas Valle de Colima, S33.81533, W70.00726, 2355 m, 7.i.2009 [7 January 2009], L. Packer (PCYU).

DISTRIBUTION: Chile: O'Higgins (R-VI): Cachapoal, Colchagua; Maule (R-VII): Curicó; Bío Bío (R-VIII): Concepción, Ñuble; Araucanía (R-IX): Malleco; Región Metropolitana (RM): Cordillera.

FLORAL RECORDS: *Primula* sp. (Primulaceae); one series of males and females were captured on flowers of an unidentified cactus (Cactaceae).

COMMENTS: This species seems to be highly variable in body size, maculation (e.g., distal

margin of mesoscutellum and metanotum often without maculation), shape of the facial fovea, clypeal basal margin, and inner orbits of the compound eyes. The features originally used to distinguish *S. karhadra* as separate species from *S. rufiventris* are all among these variable features and with larger series it is apparent that the two intergrade. *Spinoliella karhadra* was initially conceived to be slightly larger, with ventrally divergent compound eyes, and a clypeal basal margin slightly convex. These are all highly variable across *S. rufiventris*, even among specimens from the same locality as indicated by Toro and Ruz (1972a: 154) and observed in our study. For example, we found that among the paratypes of *S. rufiventris* deposited at SEMC, larger bees tend to have the inner compound eye orbits diverging ventrally and a shorter clypeus (more than 4× broader than long), basally straight. The same phenomenon was observed in males of *S. herbsti*. We also found that in some females the facial fovea is about the same size across its length, with the clypeus basally slightly convex. Thus, such specimens could be identified as *S. karhadra,* but we did not find other features (i.e., sculpturing, shape of pygidial and metabasitibial plates) that reliably separate them from the typical *S. rufiventris*. Additionally, there are specimens with intermediate features, such as a normal body size and inner orbits slightly divergent ventrally. These observations suggest that the types of *S. karhadra* are nothing more than large specimens of *S. rufiventris*, principally in terms of head width (head widths of *S. karhadra* are 2.8 mm in the holotype male and 2.2 mm in the allotype female, while in smaller *S. rufiventris* these measurements are 2.1 mm and 1.8 mm in the male and female, respectively, but intermediates are known). Intraspecific variations in body size, particularly in the head and often resulting from allometry, are not unusual across bees (e.g., Sakagami and Moure, 1965; Danforth, 1991; Packer et al., 2003; Engel, 2008; Engel et al., 2012). Therefore, it is likely that the ventrally divergent compound eyes as well as the clypeus basally more pronouncedly convex are perhaps modifications related with a large body size. Given that the holotype and allotype of *S. karhadra* fall within the overall variation, there are no differences in the male terminalia, and this putative species is sympatric with *S. rufiventris*, we have considered the former to be a junior synonym of the latter.

Spinoliella ruzi Compagnucci

Figure 20F

Spinoliella ruzi Compagnucci, 2015: 83 (holotype ♀, MACN: Mendoza, Argentina).

Diagnosis: This Argentinean species is quite similar morphologically to *S. rufiventris* from Chile. It can be separated by the narrower pygidial plate of the female and the slender median process of S8 of the male (fig. 20F).

Material examined (*n*= 1♀, 3♂♂): Argentina: 1♀, 3♂♂, nr. Nahuel Huapi [Neuquén], -41.02984, -71.312778, 927 m, 24.i.2007 [24 January 2007], vane trp, L. Packer (1♀, 2♂♂ PCYU, 1♂ SEMC).

Distribution: Argentina: Mendoza, Neuquén.

Comments: This species was described from Laguna Diamante, San Carlos, Mendoza, a locality in west-central Argentina about 20 km from the border with Chile. The specimens examined in the present work were collected near Nahuel Huapi Lake in southern Neuquén, Argentina, about 700 km south of the type locality.

Spinoliella tadeyi Compagnucci

Figure 21

Spinoliella tadeyi Compagnucci, 2015: 79 (holotype ♀, MACN: Neuquén, Argentina).

Diagnosis: This Argentinean species can be recognized easily by the following combination of features: small body size (~4 mm); female mesobasitarsus robust, 2.6× longer than broad

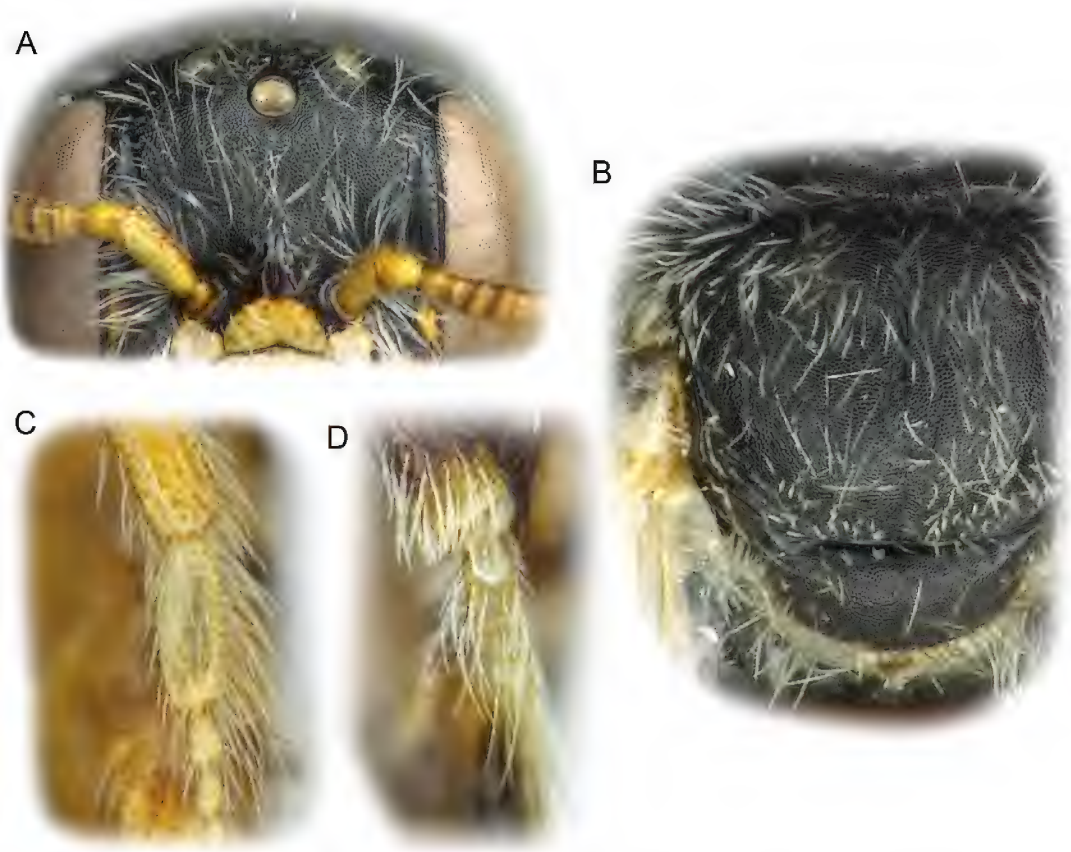

FIGURE 21. Female of *Spinoliella tadeyi* Compagnucci from Santa Cruz, Argentina (PCYU). **A.** Detail of frons. **B.** Detail of mesoscutum, mesoscutellum, and metanotum in dorsal view. **C.** Mesobasitarsus. **D.** Metabasitibial plate.

(fig. 21C); metabasitibial plate of both sexes slightly depressed, asetose on disc, delimited by weak border (fig. 21D); female pygidial plate broad, with lateral margins converging toward apex at a 50° angle, apically bifid; frons, mesoscutum, mesoscutellum, and propodeum with minute, contiguous punctures (fig. 21B); and metasoma predominantly yellowish in the female, with dark brown bands on discs of T2–T4, that of male mainly dark brown with lateral maculation on basal four terga. Both sexes of this species resemble *S. aidae* in the small body size, bifid female pygidial plate, and coloration, but in the latter species the integument of the head and mesosoma is smooth, shiny, and largely impunctate.

Material examined (n = 6♀♀, 21♂♂): Argentina: **Chubut:** 1♀, 1♂, Chubut, Sarmiento, 24 km W, 45°32.17′S, 69°17.62′W, 310 m, 21–31 Dec 2006, M.E. Irwin, malaise trap, FDP88795 (BBSL); 1♀, 1♂, Rada Tilly, -45.9639, -67.5734, 19.xii.05 [19 December 2005], AI Gravel, Rocha J (1♂ PCYU, 1♀ SEMC); 5♂♂, 8 km S of Rada Tilly, -45.9845, -67.6056, 30 m, 24.xi.2003 [24 November 2003], L. Packer (4♂♂ PCYU, 1♂ SEMC); **Santa Cruz:** 3♂♂, Santa Cruz, Los Antiguos, 18.xi.06 [18 November 2006], pan traps (PCYU); 1♀, 1♂, Estancia La Serena, near Los Antiguos, S46°37.044′, W71°16.133′, 26.xi–19.xii.05 [26 November–19 December 2005], pan trap, AI Gravel (PCYU); 1♀, 7♂♂, near Los

Antiguos, -46.6174, -71.2687, 17.xii.05–01.i.06 [17 December 2005–1 January 2006], pan traps, AI Gravel (PCYU); 1♀, 1♂, 25 km E of Los Antiguos, -46.6195, -71.3047, 250 m, 17–19. xi.2003 [17–19 November 2003], L. Packer (1♀ PCYU, 1♂ SEMC); 1♀, 2♂♂, same as previous except 46°37′187″S, 71°18′322″W, 250 m, 01. iii.2007 [1 March 2007], blue vane trap, AI & M Gravel (PCYU).

Distribution: Argentina: Chubut, Neuquén, Santa Cruz. This species was previously known from Neuquén (see Compagnucci, 2015) but is recorded here from two further provinces.

DISCUSSION

Our analysis indicates that *Xeranthrena* are clearly part of the *Spinoliella* group of genera, a clade that is strongly supported by several synapomorphies and high bootstrap (99) and Bremer (10) values. It also suggests that it is the sister group of *Spinoliella* + *Callonychium*. The new genus shares some features with both genera. For example, the female clypeus, which is preapically depressed on the disc, penis valves of the male genitalia not connected by a narrow bridge, and the male S8 with a rectangular body with a median process apically expanded and abruptly separated, are similar to those found in some species of *Callonychium* (e.g., Ruz, 1991; Toro and Herrera, 1980). Characters shared with *Spinoliella* are: the lack of maculation on the gena, the lower paraocular area with maculation not extending upward as a narrow band along the inner orbit, the lower margin of the toruli at lowest third of the face, bifurcate pretarsal claws, the shape of the male S7, and the elongate male gonocoxite.

Our analysis also recovered within *Spinoliella* two well-defined clades, moderately supported by bootstrap and Bremer values, and that correspond to the previously recognized subgenera. Both clades are supported by those morphological characters indicated in the key to the subgenera of *Spinoliella* of Ruz (1991), except for the width of the male facial fovea, which is supposed to be narrower in *Spinoliella* s. str. than in *S.* (*Peniella*). However, such a character is variable and found in the Argentinean species *S. aidae* and *S. tadeyi*, which would have otherwise clearly been placed within *S.* (*Peniella*) based on other characters, including those of the female. Given that our analysis supports the monophyly of both subgenera and validated stable characters, they could be recognized as valid, as has been done so by some authors (e.g., Moure and DalMolin, 2007). However, we agree with Michener (2000, 2007) that their recognition seems superfluous given that the morphological differences are not especially striking.

Species of *Spinoliella* appear to be restricted to either Argentina or Chile, with most species occurring in the latter country and reaching sometimes elevations above 3000 m (table 3). Except for *S. obscura*, which is a member of the small clade containing *S. nomadoides*, the remaining four Argentinean species clustered within the clade containing *S. maculata*. Despite the fact that *Spinoliella* have been the subject of multiple investigations over the last 45 years, questions remain regarding the limits of some species. For example, *S. rozeni* and *S. rufiventris* appear to be highly variable and each may contain distinct species difficult to discern based on available evidence; these species therefore run out in multiple places within our key. Conversely, *S. karhadra* is assuredly a synonym of *S. rufiventris*, and the male of *S. polita* remains to be discovered. These realities collectively demonstrate that yet more work needs to be undertaken on these bees before we have a completely satisfactory arrangement of the known species. Moreover, the biology of *Spinoliella* remains little known, with only brief accounts or notes on the nests of a couple species (Claude-Joseph, 1926; Rozen, 2013). Likewise, floral records are scant and do not distinguish between visits for pollen versus nectar. Based on the records compiled from the literature and specimen labels, floral associations for 12 species of *Spinoliella* include seven plant families and at least 15 species (table 4). Malvaceae and Solanaceae are the

families with most records and are likely pollen sources for these species. Regardless, the discovery of *X. imponticula* and those species of *Spinoliella* described here, along with the numerous other new and fascinating andrenids described in recent years from South America (e.g., Ascher et al., 2006; Gonzalez et al., 2013c, 2014; Ramos, 2014; Ramos and Rozen, 2014), highlight how the diversity of these groups in the region has been underappreciated and overlooked.

ACKNOWLEDGMENTS

We dedicate this paper to the memory of our dear friend and mentor, Charles D. Michener (1918–2015), and we regret that he did not live to see this work in print. For the loan of specimens used in this project, particularly of historical type material, we are greatly indebted to each of the curators listed by institution in the Material and Methods. Of particular note we wish to express our gratitude to Jerome G. Rozen, Jr., and Laurence Packer for their generosity, eager support of this work, and patience during its lengthy gestation. Mary Knight blessed us with her expert assistance and graciously checked and made suggestions for our etymologies. Jennifer C. Thomas, Zachary H. Falin, and Kellie K. Magill Engel were of considerable assistance throughout the work. Lastly, we are thankful to two anonymous reviewers for their comments and suggestions that improved this work, and to Lorenzo Prendini and David A. Grimaldi for their help shepherding the manuscript through the editorial process. This study was supported at various stages during the many years of its development by U.S. National Science Foundation grants DBI-0096905, EF-0341724, and DBI-1057366 (both to M.S.E.), and to Robert G. Goelet, Chairman Emeritus of the AMNH (for supporting M.S.E.'s work on the project while employed at the AMNH in the late 1990s). This is a contribution of the Division of Entomology, University of Kansas Natural History Museum.

REFERENCES

APG [Angiosperm Phylogeny Group]. 2009. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. Botanical Journal of the Linnean Society 161 (2): 105–121.

Ascher, J.S., M.S. Engel, and T.L. Griswold. 2006. A new subgenus and species of *Oxaea* from Ecuador (Hymenoptera: Andrenidae). Polskie Pismo Entomologiczne 75 (4): 539–552.

Ashmead, W.H. 1898. Some new genera of bees. Psyche 8 (271) 282–285.

Ashmead, W.H. 1899. Classification of the bees, or the superfamily Apoidea. Transactions of the American Entomological Society 26 (1): 49-100.

Bremer, K. 1994. Branch support and tree stability. Cladistics 10 (3): 295–304.

Brèthes, J. 1922. Himenópteros y Dípteros de varias procedencias. Anales de la Sociedad Cientifica Argentina 93: 119–146.

Claude-Joseph, F.H. 1926. Recherches biologiques sur les hyménoptères du Chili (mellifères). Annales des Sciences Naturelles, 10e Série, Zoologie 9 (8): 113–268.

Cockerell, T.D.A. 1905. Notes on some bees in the British Museum. Transactions of the American Entomological Society 31 (4): 309–364.

Cockerell, T.D.A. 1917. Descriptions and records of bees — LXXVIII. Annals and Magazine of Natural History, Eighth Series 20 (120): 436–441.

Cockerell, T.D.A., and E. Atkins. 1902. Contributions from the New Mexico Biological Station — XIII. On the bees of the family Nomadidae of Ashmead. Annals and Magazine of Natural History, Seventh Series 10 (55): 40–46.

Cockerell, T.D.A., and W. Porter. 1899. Contributions from the New Mexico Biological Station — VII. Observations on bees, with descriptions of new genera and species. Annals and Magazine of Natural History, Seventh Series 4 (24): 403–421.

Compagnucci, L.A. 2004. El género *Acamptopoeum* Cockerell: tres nuevas especies y clave para la identificación de las especies Argentinas (Hymenoptera, Andrenidae). Revista del Museo Argentino de Ciencias Naturales 6 (2): 321–332.

Compagnucci, L.A. 2015. Revisión del género *Spinoliella* Ashmead (Apoidea, Andrenidae) en la Argentina, con descripción de cuatro nuevas especies. Revista del Museo Argentino de Ciencias Naturales 17 (1): 77–86.

Danforth, B.N. 1991. The morphology and behavior of dimorphic males in *Perdita portalis* (Hymenoptera:

Andrenidae). Behavioral Ecology and Sociobiology 29 (4): 235–247.

Danforth, B.N. 1994. Taxonomic review of *Calliopsis* subgenus *Hypomacrotera* (Hymenoptera: Andrenidae), with special emphasis on the distributions and host plant associations. Pan-Pacific Entomologist 70 (4): 283–300.

Engel, M.S. 2000. A revision of the panurgine bee genus *Arhysosage* (Hymenoptera: Andrenidae). Journal of Hymenoptera Research 9 (1): 182–208.

Engel, M.S. 2001. A monograph of the Baltic amber bees and evolution of the Apoidea (Hymenoptera). Bulletin of the American Museum of Natural History 259: 1–192.

Engel, M.S. 2005. Family-group names for bees (Hymenoptera: Apoidea). American Museum Novitates 3476: 1–33.

Engel, M.S. 2008. A new Andean species of *Augochloropsis* from Peru (Hymenoptera: Halictidae). Sociobiology 52 (1): 5–11.

Engel, M.S. 2009. Revision of the bee genus *Chlerogella* (Hymenoptera, Halictidae), part I: Central American species. ZooKeys 23: 47–75.

Engel, M.S. 2011. Systematic melittology: where to from here? Systematic Entomology 36 (1): 2–15.

Engel, M.S., I.A. Hinojosa-Díaz, and D.J. Bennett. 2012. New species of macrocephalic halictine bees (Hymenoptera: Halictidae). Annales Zoologici 62 (2): 297–307.

Engel, M.S., A.S. Alqarni, and M.A. Shebl. 2017. Discovery of the bee tribe Tarsaliini in Arabia (Hymenoptera: Apidae), with the description of a new species. American Museum Novitates 3877: 1–28.

Felsenstein, J. 1985. Confidence limits on phylogenies: an approach using the bootstrap. Evolution 39 (4): 783–791.

Friese, H. 1906. Neue Bienenarten aus Chile und Argentina. Zeitschrift für Systematische Hymenopterologie und Dipterologie 6 (3): 169–176.

Friese, H. 1916. Neue Bienen-Arten aus Chile und Südamerika (Gatt. *Camptopoeum*, *Psaenythia* und *Panurginus* Hym.). Stettiner Entomologische Zeitung 77 (1): 163–174.

Goloboff, P.A., J. Farris, and K. Nixon. 2003. T.N.T.: tree analysis using new technology [program and documentation]. Online resource (http://www.zmuc.dk/public/phylogeny/tnt/).

Goloboff, P.A., J.S. Farris, and K.C. Nixon. 2008. TNT, a free program for phylogenetic analysis. Cladistics 24 (5): 774–786.

Gonzalez, V.H. 2004. A new species of *Acamptopoeum* from Colombia (Hymenoptera: Andrenidae: Panurginae). Caldasia 26 (1): 239–243.

Gonzalez, V.H., and M.S. Engel. 2011. *Andinopanurgus*, a new Andean subgenus of *Protandrena* (Hymenoptera, Andrenidae). ZooKeys 126: 57-76.

Gonzalez, V.H., and M.S. Engel. 2016. A new species of *Callonychium* Brèthes from Argentina (Hymenoptera: Andrenidae). Euroasian Entomological Journal 15 (Suppl. 1): 31–34.

Gonzalez, V.H., and L. Ruz. 2007. New enigmatic Andean bee species of *Protandrena* (Hymenoptera, Andrenidae, Panurginae). Revista Brasileira de Entomologia 51 (4): 397–403.

Gonzalez, V.H., T. Griswold, and M.S. Engel. 2013a. Obtaining a better taxonomic understanding of native bees: where do we start? Systematic Entomology 38(4): 645–653.

Gonzalez V.H., M.S. Engel, and P.A. Sepúlveda. 2013b. Taxonomic and biological notes on *Andinopanurgus* (Hymenoptera: Andrenidae). Journal of Melittology 3: 1–10.

Gonzalez, V.H., C. Rasmussen, and M.S. Engel. 2013c. *Incasarus garciai*, a new genus and species of panurgine bees from the Peruvian Andes (Hymenoptera: Andrenidae). Journal of Melittology 8: 1–9.

Gonzalez, V.H., C. Rasmussen, and M.S. Engel. 2014. A new species of *Liphanthus* from Peru (Hymenoptera: Andrenidae). Journal of Melittology 31: 1–9.

Herrera, J., and M. Etcheverry. 1960. Actualización de los nombres de los ápidos estudiados por Claude Joseph. Publicaciones del Centro de Estudios Entomologicos, Universidad de Chile 1: 63–64.

Michener, C.D. 1942. Taxonomic observations on bees with descriptions of new genera and species (Hymenoptera; Apoidea). Journal of the New York Entomological Society 50 (3): 273–282.

Michener, C.D. 1953. Comparative morphological and systematic studies of bee larvae with a key to the families of hymenopterous larvae. University of Kansas Science Bulletin 35 (8): 987–1102.

Michener, C.D. 1997. Genus-group names of bees and supplemental family-group names. Scientific Papers, Natural History Museum, University of Kansas 1: 1–81.

Michener, C.D. 2000. The bees of the world. Baltimore: Johns Hopkins University Press, xiv + [i] + 913 pp., +16 pls.

Michener, C.D. 2007. The bees of the world, 2nd ed. Baltimore: Johns Hopkins University Press, xvi + [i] + 953 pp., +20 pls.

Moore, M.J., P.S. Soltis, C.D. Bell, J.G. Burleigh, and D.E. Soltis. 2010. Phylogenetic analysis of 83 plastid genes further resolves the early diversification of eudicots. Proceedings of the National Academy of Sciences of the United States of American 107 (10): 4623–4628.

Moure, J.S., and A. DalMolin. 2007. Calliopsini Robertson, 1922. *In* J.S. Moure, D. Urban, and G.A.R. Melo (editors), Catalogue of bees (Hymenoptera, Apoidea) in the Neotropical region: 6–14. Curitiba: Sociedade Brasileira de Entomologia, xiv + 1058 pp. [updated online (http://www.moure.cria.org.br/catalogue), accessed 9 February 2017]

Nixon, K.C. 1999. WinClada, (beta) version 0.9 [program and documentation]. Ithaca: Published by the author.

Packer, L. 2004. Morphological variation in the gastral sterna of female Apoidea (Insecta: Hymenoptera). Canadian Journal of Zoology 82 (1): 130–152.

Packer, L., B.W.T. Coelho, S. Mateus, and R. Zucchi. 2003. Behavioral interactions among females of *Halictus* (*Seladonia*) *lanei* (Moure) (Hymenoptera: Halictidae). Journal of the Kansas Entomological Society 76 (2): 177–182.

The Plant List. 2013. Version 1.1. Online resource (http://www.theplantlist.org), accessed 9 February 2017.

Ramos, K.S. 2013. The bee genus *Arhysosage* Brèthes (Apidae: Andreninae: Calliopsini): new species, taxonomic notes and new distribution records from Brazil. Journal of Natural History 47 (43–44): 2735–2747.

Ramos, K.S. 2014. Three new bee species of *Rhophitulus* Ducke (Hymenoptera, Apidae, Protandrenini) from Argentina and Brazil. Zootaxa 3847 (4): 545–556.

Ramos, K.S., and J.G. Rozen, Jr. 2014. *Psaenythisca*, a new genus of bees from South America (Apoidea: Andrenidae: Protandrenini) with a description of the nesting biology and immature stages of one species. American Museum Novitates 3800: 1–32.

Reveal, J.L., and M.W. Chase. 2011. APG III: Bibliographical information and synonymy of Magnoliidae. Phytotaxa 19: 71–134.

Robertson, C. 1922. Synopsis of Panurgidae. Psyche 29 (4): 159–173.

Rodríguez, S., H. Toro, and L. Ruz. 2001. Dos nuevas especies chilenas del género *Spinoliella* (Apoidea: Andrenidae). Revista Chilena de Entomología 28: 99–106.

Roig-Alsina, A., and L.A. Compagnucci. 2003. Description, phylogenetic relationships, and biology of *Litocalliopsis adesmiae*, a new genus and species of South American calliopsine bees (Hymenoptera, Andrenidae). Revista del Museo Argentino de Ciencias Naturales 5 (1): 99–112.

Rozen, J.G., Jr. 1958. Monographic study of the genus *Nomadopsis* Ashmead (Hymenoptera: Andrenidae). University of California Publications in Entomology 15: 1–202.

Rozen, J.G., Jr. 2013. Mature larvae of calliopsine bees: *Spinoliella*, *Callonychium*, and *Arhysosage* including biological notes, and a larval key to calliopsine genera (Hymenoptera: Apoidea: Andrenidae: Panurginae). American Museum Novitates 3782: 1–27.

Rozen, J.G., Jr., and D. Yanega. 1999. Nesting biology and immature stages of the South American bee genus *Acamptopoeum* (Hymenoptera: Andrenidae: Panurginae). University of Kansas Natural History Museum Special Publication 24: 59–67.

Ruz [-Escudero], L. 1986. Classification and phylogenetic relationships of the panurgine bees (Hymenoptera-Andrenidae). Ph.D. dissertation, University of Kansas, Lawrence, iii + 312 + [68] pp.

Ruz, L. 1991. Classification and phylogenetic relationships of the panurgine bees: the Calliopsini and allies (Hymenoptera: Andrenidae). University of Kansas Science Bulletin 54 (7): 209–256.

Sakagami, S.F., and J.S. Moure. 1965. Cephalic polymorphism in some Neotropical halictine bees (Hymenoptera – Apoidea). Anais da Academia Brasileira de Ciências 37 (2): 303–313.

Shinn, A.F. 1965. The bee genus *Acamptopoeum*: diagnosis, key, and a new species (Hymenoptera: Andrenidae). Journal of the Kansas Entomological Society 38 (3): 278–284.

Shinn, A.F. 1967. A revision of the bee genus *Calliopsis* and the biology and ecology of *C. andreniformis* (Hymenoptera, Andrenidae). University of Kansas Science Bulletin 46 (21): 753–936.

Smith, F. 1853. Catalogue of the hymenopterous insects in the collection of the British Museum. Part 1. Andrenidae and Apidae. London: British Museum, [i] + 198 pp., +pls. i–vi.

Soltis, D.E., P.S. Soltis, P.K. Endress, and M.W. Chase. 2005. Phylogeny and evolution of angiosperms. Sunderland: Sinauer, x + 370 pp.

Spinola, M. 1851. Hymenópteros. *In* C. Gay (editor), Historia física y política de Chile, Zoología: tomo sesto [sic] [vol. 6]: 153–569. Paris: Casa del autor, 572 pp.

Toro, H. 1989. Contribución al conocimiento de los Panurginae chilenos (Apoidea, Andrenidae). Acta Entomológica Chilena. 15: 229–231.

Toro, H. 1995. Una nueva especie de *Spinoliella* (Apoidea: Andrenidae) del norte de Chile. Acta Entomológica Chilena 19: 105–107.

Toro, H., and M. Herrera. 1980. Las especies chilenas del género *Callonychium* (Andrenidae-Apoidea) y descripción de un nuevo género. Anales del Museo de Historia Natural de Valparaíso 13: 213–225.

Toro, H., and L. Ruz. 1972a. Revisión del género *Spinoliella* (Andrenidae-Apoidea). Anales del Museo de Historia Natural de Valparaíso 5: 137–171.

Toro, H., and L. Ruz. 1972b. Appendice: revisión del género *Spinoliella* (Andrenidae-Apoidea). Anales del Museo de Historia Natural de Valparaíso 5: 293–295.

Scientific Publications of the American Museum of Natural History

American Museum Novitates
Bulletin of the American Museum of Natural History
Anthropological Papers of the American Museum of Natural History

Publications Committee
Robert S. Voss, Chair

Board of Editors
Jin Meng, Paleontology
Lorenzo Prendini, Invertebrate Zoology
Robert S. Voss, Vertebrate Zoology
Peter M. Whiteley, Anthropology

Managing Editor
Mary Knight

Submission procedures can be found at http://research.amnh.org/scipubs

All issues of *Novitates* and *Bulletin* are available on the web (http://digitallibrary.amnh.org/dspace). Order printed copies on the web from:
http://shop.amnh.org/a701/shop-by-category/books/scientific-publications.html

or via standard mail from:

American Museum of Natural History—Scientific Publications
Central Park West at 79th Street
New York, NY 10024

♾ This paper meets the requirements of ANSI/NISO Z39.48-1992 (permanence of paper).

On the cover: A calliopsine bee, represented by an undescribed species of *Callonychium* Brèthes, on flowers of *Baccharis salicifolia* (Ruiz & Pav.) Pers. (Asteraceae) in the Ica Region of Peru (photo courtesy of E.Y. Sánchez Sandoval).